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A Revision of *Agathirsia* Westwood (Hymenoptera: Braconidae: Agathidinae) With Notes on Mouthpart Morphology

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Abstract.—A cladistic analysis of *Agathirsia* Westwood is performed and synapomorphies are proposed for the first time for members of *Agathirsia*, i.e., reduction of the ventral mandibular tooth, and apicomedial pegs of the hind tibia flattened, and for members of its sister-group *Crassomicrodus* Ashmead, i.e., apicomedial pegs of the hind tibia sharp and seta-like, and tarsal claws simple, without basal lobes. Members of *Agathirsia* are restricted to the arid regions of Mexico and the southwestern USA. Keys are provided to identify the genera of Agathidini and the species of *Agathirsia*. The mouthparts of *Agathirsia* are described and three main types of nectar extraction mechanisms are discussed, i.e., 1) sponge-like glossa that retracts within the galeae, 2) straw-like glossa that does not retract, and 3) labial palpi that form a drinking tube. The genus *Agathirsia* is revised to include 31 species, 23 of which are newly described, i.e., ***A. armandi, A. asterophila, A. bicolor, A. bifidilingua, A. campanisura, A. capillata, A. collini, A. davidi, A. foveiseries, A. heleni, A. kellyi, A. keni, A. jervisi, A. longigladia, A. longilingua, A. michelei, A. minuata, A. ninesevensi, A. papoui, A. parkeningi, A. reai, A. rostrata,*** **and** ***A. tiro. Agathirsia rufiventris*** **Westwood** is considered a **junior synonym** of ***A. proxima*** **Westwood.** The monotypic genus ***Cenostomus*** is synonomized with ***Agathrisia. Cenostomus trichiosomus*** **(Cameron)** is transferred to ***Agathirsia,*** and ***Crassomicrodus pumilus*** **(Szepligeti)** is transferred to ***Bassus*** **Fabricius.**

Agathirsia Westwood is a member of the Agathidinae, which is a well-established monophyletic group within the Braconidae (Sharkey 1992). Three autapomorphies for the subfamily are the presence of specialized male tergal glands on metasomal segments 7 and 8 (Buckingham and Sharkey 1988), a wing fold between the prestigma and the medial vein of the forewing, and a narrow marginal cell (Sharkey 1992). Agathidinae is a cosmopolitan subfamily composed of 52 genera (Sharkey 1997) and members are found in most terrestrial habitats.

Here we describe and key all known species of *Agathirsia,* members of which are restricted to the arid regions of Mexico and the southwestern USA. We also present a key to distinguish *Agathirsia* and *Crassomicrodus* from other agathidines with which they may be confused. A cladistic analysis is performed with the aims of testing the monophyly of *Crassomicrodus* and *Agathirsia,* revealing the relationships among species of *Agathirsia,* and uncovering the evolution of morphological characters such as those of the mouthparts. Previous to this study eight species of *Agathirsia* were described but the single revision of the genus (Muesebeck 1927) reviewed only species found north of Mexico. Neither Muesebeck's key to North American agathidine genera, nor Sharkey's (1997) key to the New World genera adequately distinguish between our concepts of *Crassomicrodus* and *Agathirsia* because they rely on the shape of the mouthparts—a variable character in both genera.

All known species of Agathidinae are solitary koinobiont endoparasitoids of larval Lepidoptera (Sharkey 1992) except for one gregarious species recently discovered by D. Janzen (unpublished). The few members of the Microdini and Agathidini with known biologies all attack the first instar larval stage of their lepidopteran hosts, and although *Agathirsia* is a putative member of the Agathidini we are not sure if its members share this characteristic. Many species of *Agathirsia* and *Crassomicrodus* have very short ovipositors. Within the Agathidinae this character state is found almost exclusively in the Disophrini, all members of which possess the state. There are few observations of members of Disophrini ovipositing but these few indicate that they attack late instars of their hosts. We suspect that the same is true for members of *Agathirsia* and *Crassomicrodus*, at least those with short ovipositors.

Little is known of the natural history of members of *Agathirsia*. We speculate that most or all species are diurnal based on their coloration and the absence of any label data to indicate otherwise. Members of *Agathirsia* appear to be restricted to the arid regions of Mexico and the southwestern USA and most species are collected from August through November, which is typically the end of a relatively wet period and the beginning of a dry period over most of the range. Many species have elongate mouthparts and since most desert flowers produce nectar in daylight hours, this is further evidence to suggest that they are diurnal.

Most members of *Agathirsia* appear to have mimetic coloration. E. G. Linsley noted the following behavior on a specimen tag of *A. nigricauda:* "while feeding [the] wasp spreads [its] wings and flashes abdominal and wing colors with each partial rotation". This behavior is similar to that of some stinging wasps and we speculate that it is likely a case of Batesian mimicry since members of *Agathirsia* have no obvious defense mechanisms. Many species of *Agathirsia* are partly or entirely orange, a common color for stinging Hymenoptera in the area. Other species of *Agathirsia* are entirely black with long, dense setae and may mimic bees.

The standard mandibular morphology for most species of Agathidinae is illustrated in figure 1a. These mandibles are rather gracile, flattened and designed to cut through silk, i.e., their own and/or that of their host Lepidoptera. In contrast, the mandibles of species of *Agathirsia* are cylindrical and much more robust (Figs. 1b,c). Due to their similarity to the mandibles of aculeate Hymenoptera that nest underground, we speculate that the shape may be a modification that facilitates digging. We suggest that species of *Agathirsia* are attacking larval Lepidoptera that are spending the daylight hours in the soil and/or that pupate in the soil. There is only one host record for *Agathirsia*; Bibby (1961) cites the larva of *Acontia cretata* (Noctuidae) as a host of *Agathirsia*, and the natural history of this host is consistent with our hypothesis. This same mandibular morphology, and perhaps the same biology, is present in members of *Crassomicrodus* as their mandibles are even more robust (Fig. 1d). Many species of *Agathirsia* have the apex of the hind tibia flared, much like bell-bottom pants. The flared region is highly sclerotized and we speculate that this may also be a modification for digging. Relative to most Agathidinae, which have rather large, cylindrical pegs on the hind tibia apico-laterally (Fig. 2a); those of members of *Agathirsia* are small and flat (Figs. 2b, c). The functional value of the flattened pegs is unknown but they may aid in soil excavation.

METHODS

Morphological terminology follows Sharkey and Wharton (1997). Glossa and galea lengths were measured from the bases of their respective palpomeres (see Fig. 4b).

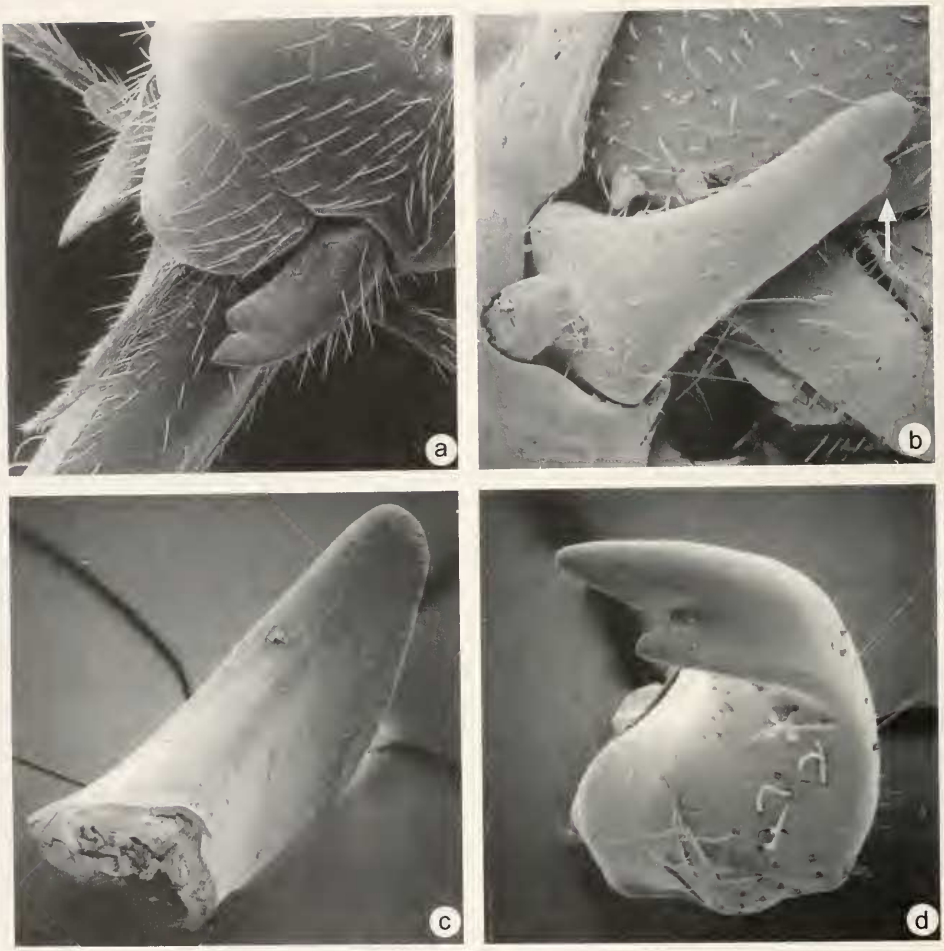
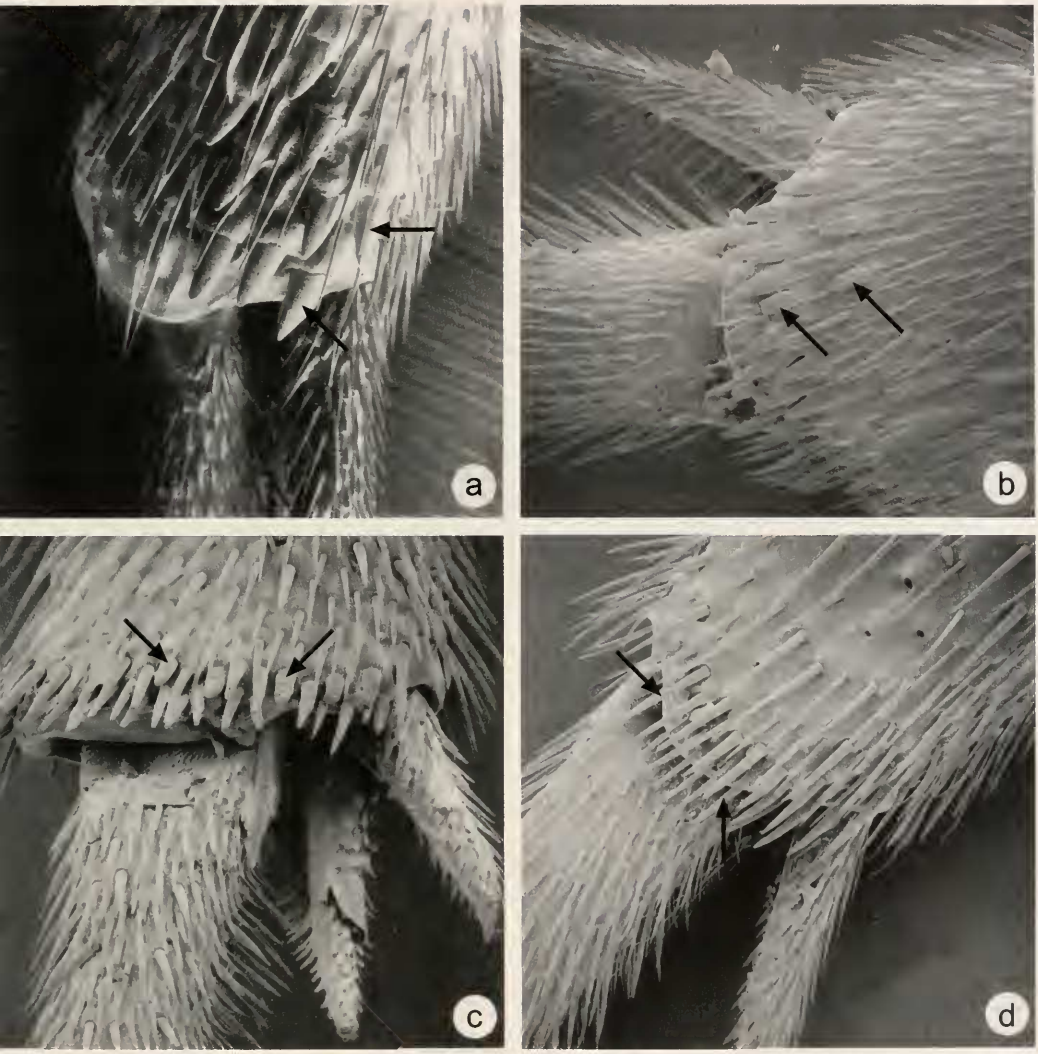


Fig. 1. Mandibles of Agathidini: a, *Agathis* sp., showing ground plan mandibles for the Agathidinae that are twisted and function like scissors to cut through silk. b, *Agathirsia testacea*, showing maximum size of ventral tooth in the genus. c, *Agathirsia nigricauda*, showing typical mandible for *Agathirsia*, robust, cylindrical, and lacking ventral tooth. d, *Crassomicrodus divisus*, showing typical shape of a mandible for *Crassomicrodus*.

The keys are designed for all known species. Although ovipositor characteristics are included, both males and females can be used. The percentages (%) indicated in the keys represent the frequency with which the user can expect to observe the character state given a specimen that should key to that side of the couplet. We weighted the common species to arrive at these figures.

The key to *Agathirsia* was produced by editing a key generated using DELTA (Dallwitz et al. 1993). The species descriptions of *Agathirsia* include total observed variation for both sexes. All measurements are in millimeters. Occasionally the glossae of short-tongued *Agathirsia* may be partly to completely folded lengthwise along the midline. The glossae of these specimens often measure 15 to 30% shorter than conspecifics because they are partly retracted. Measurements of these have not been included in the descriptions except where noted. The number of hind tibial pegs is a character that is often difficult to observe; high magnification with diffused lighting is essential.

The holotypes of all described species of



ig. 2. Hind tibial pegs: a, *Bassus ussuriensis*, showing typical cylindrical pegs of the Agathidinae. b, *Agathirsia igricauda*, showing flattened pegs. c, *Agathirsia collini*, showing flattened pegs. d, *Crassomicrodus divisus*, showng hair-like spines.

Agathirsia were examined. If a reliably determined species of *Crassomicrodus* was not present in the original assemblage of material the holotype was examined to ensure it was not a misplaced species of *Agathirsia*.

Depositories.—The following are the contributing museums. Acronyms are from Arnett et al. (1993) except for ATAM which is not included in their list: American Entomological Institute, Gainesville, Florida (AEIC); American Museum of Natural History, New York, New York (AMNH); Academy of Natural Sciences, Philadelphia, Pennsylvania (ANSP); Universidad Autonoma de Tamaulipas, Ciudad Victoria, Tamaulipas, Mexico (ATAM); British Museum of Natural History, London, England (BMNH); California Academy of Sciences, San Francisco, California (CASC); Canadian National Collection of Insects, Ottawa, Ontario

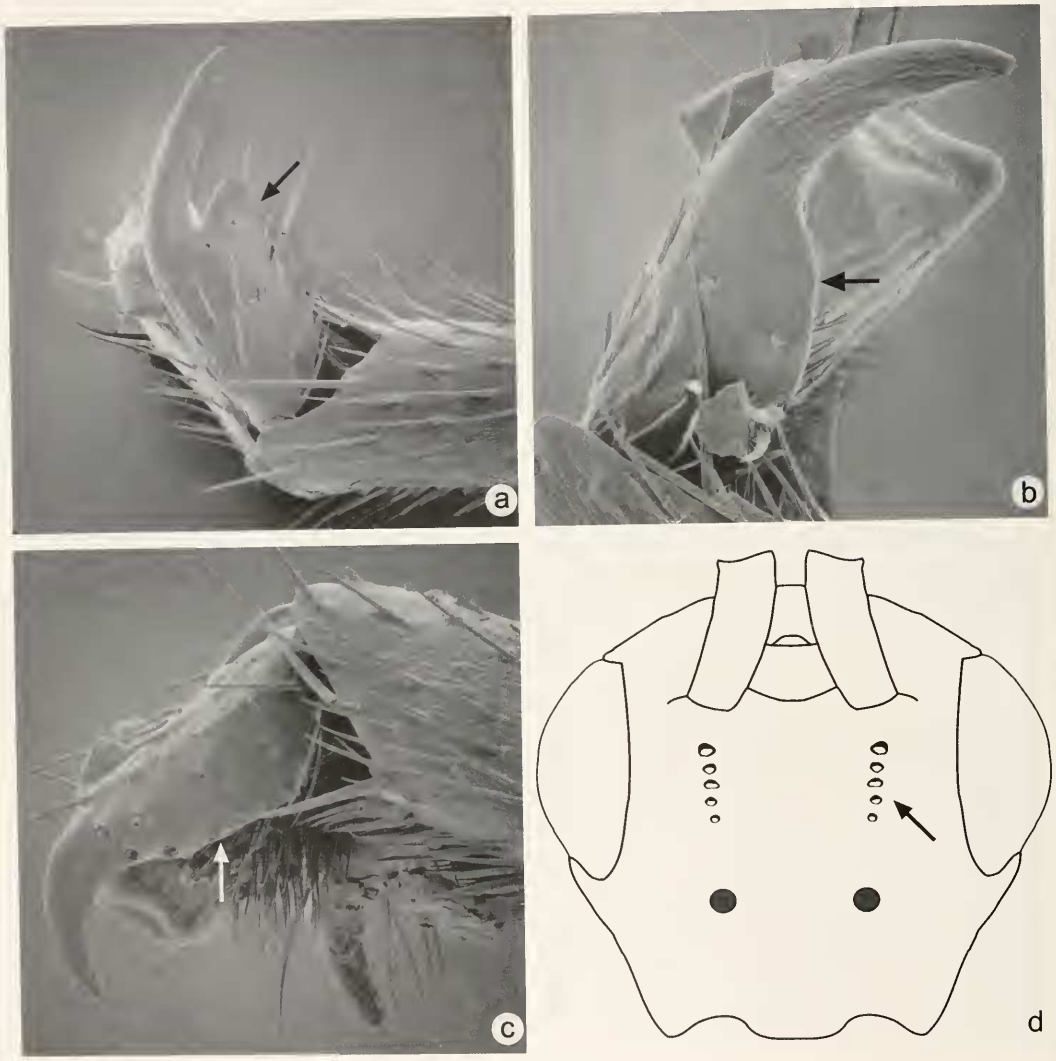


Fig. 3. Claws: a, *Agathirsia trichiosoma*, showing well developed basal lobe. b, *Agathirsia bicolor*, with basal lobe vestigial. c, *Crassomicrodus divisus*, with basal lobe absent. d, Head of *Agathirsia rostrata*, showing foveae below antennal insertions.

(CNCI); Deutshes Entomologisches Institut, Eberswalde, Germany (DEIC); Essig Museum of Entomology, University of California Berkley, California (EMEC); Los Angeles County Museum, Los Angeles, California (LACM); Michigan State University, Department of Entomology Collection, East Lansing, Michigan (MSUC); Oregon State University, Department of Entomology Collection, Corvallis, Oregon (OSUO); Oxford University Hope Entomological Collections, Oxford, England (OXUM); Snow Entomological Museum, University of Kansas, Lawrence, Kansas (SEMC); Texas A&M University, Department of Entomology Insect Collection, College Station, Texas (TAMU); University of Arkansas, Department of Entomology Collection, Fayetteville, Arkansas (UADE); Bohart Museum, University of California Davis, California (UCDC); University of Michigan, Division of Insects,

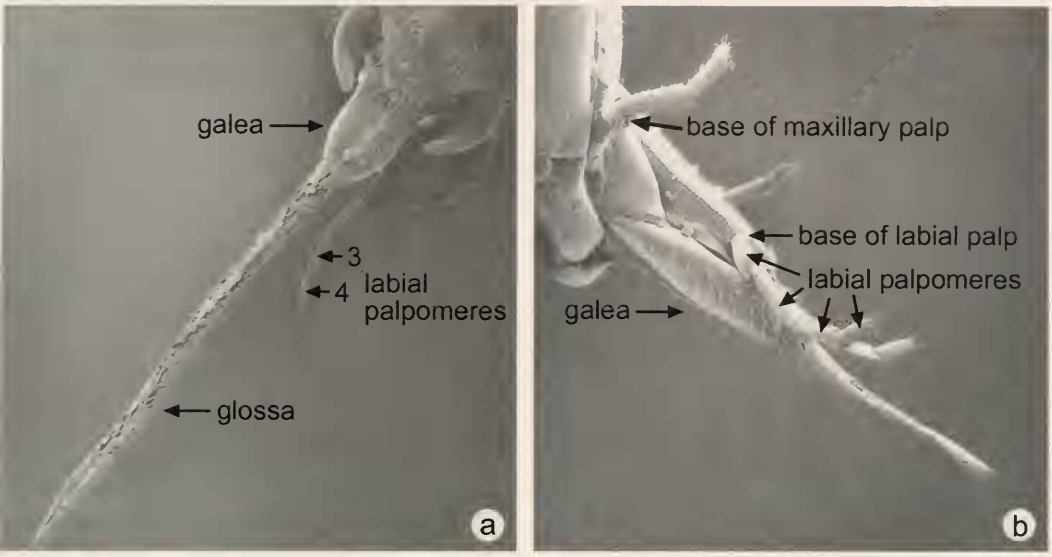


Fig. 4. Mouthparts: a, *Agathirsia proxima*, illustrating Type II mouthparts with the glossa adapted for straw-like sucking. b, *A. nigricauda*, illustrating Type I mouthparts in which the glossa is folded and enclosed by the galea in the drinking process.

Museum of Zoology, Ann Arbor, Michigan (UMMZ); United States National Museum of Natural History, Washington, D.C. (USNM).

MOUTHPART MORPHOLOGY

A recurring adaptation of parasitoid wasps is the presence of elongate mouthparts to facilitate nectar extraction from deep corollas (Jervis 1998). This is especially apparent in the Braconidae and Aculeata. In Braconidae, elongate mouthparts are present in members of five of the 29 subfamilies (Jervis 1998). Elongate glossae are common in *Agathirsia* but there is a great deal of interspecific variation. Jervis (1998) categorized the nectar feeding of parasitoid wasps into six types and placed species of *Agathirsia* into three of these. His Type I consists of "Elongated glossa and galea, glossa shallowly bilobed/forked and concealed by the galea for most of its length in dried specimens". *Agathirsia nigricauda* (Viereck) and *A. cressoni* Muesebeck & Walkley are cited as examples. Another category (Jervis' Type IV) is described as "Elongated glossa, galea and labial palps; glossa exposed for much of its length in dried specimens; labial palps closely aligned with glossa and assisting in nectar extraction/conduction". *Agathirsia* sp.1 (probably *A. longilingua* Pucci and Sharkey n.sp.) was given as an example of this category. Jervis also assigned a, then undescribed, species of *Agathirsia* (= *A. jervisi*) to his Type VI which consists of wasps with "Elongated glossa and labial palps; inner surfaces of labial palps concave" and covered with long and dense setae.

We recognize the same three types of nectar extraction mechanisms in *Agathirsia*. Species with Jervis' Type I mouthparts have glossae that vary in length from approximately 0.25 to 1.8 mm. The glossae are covered with dense setae that apparently are specialized for liquid uptake. The morphology of these setae is variable. Figure 8a shows the spoon-like setae of *A. testacea* (glossa length = 0.48 mm) and figure 8b shows the scale-like setae of *A. nigricauda* (glossa length = 1.4 mm). After

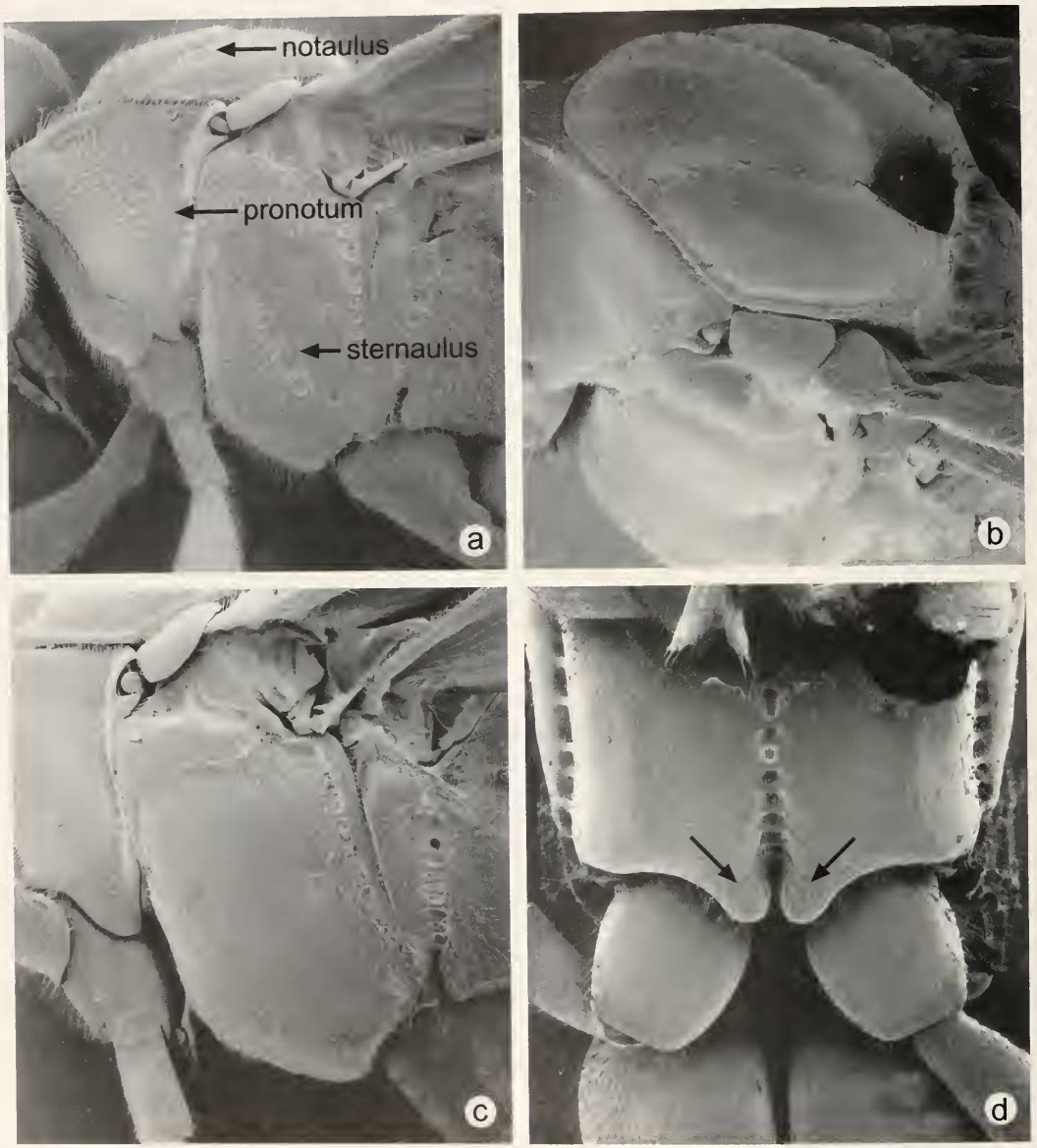


Fig. 5. *Agathirsia* spp., thoracic sculpture: a, *A. davidi*, showing foveate (crenulate) notaulus and sternaulus. b, c, *A. proxima*, showing smoothly impressed notauli and mostly absent sternaulus. d, *A. testacea*, showing posterior lobes of mesopleura.

the glossa is loaded with liquid we suppose it is retracted into the galea. Dried specimens, in which the glossa are partly retracted, show that the glossa folds posteriorly along its midlength as it is retracted. This results in the posterior surfaces of each half of the glossa being pushed against each other which would squeeze liquid towards the mouth opening. The galea likely acts as a template forcing the two halves of the glossa together as they are retracted. As with all other drinking types, the cibarial and pharyngeal pumps provide the negative pressure necessary to suck the liquid into the oral cavity.

Jervis' Type IV mouthparts are manifest

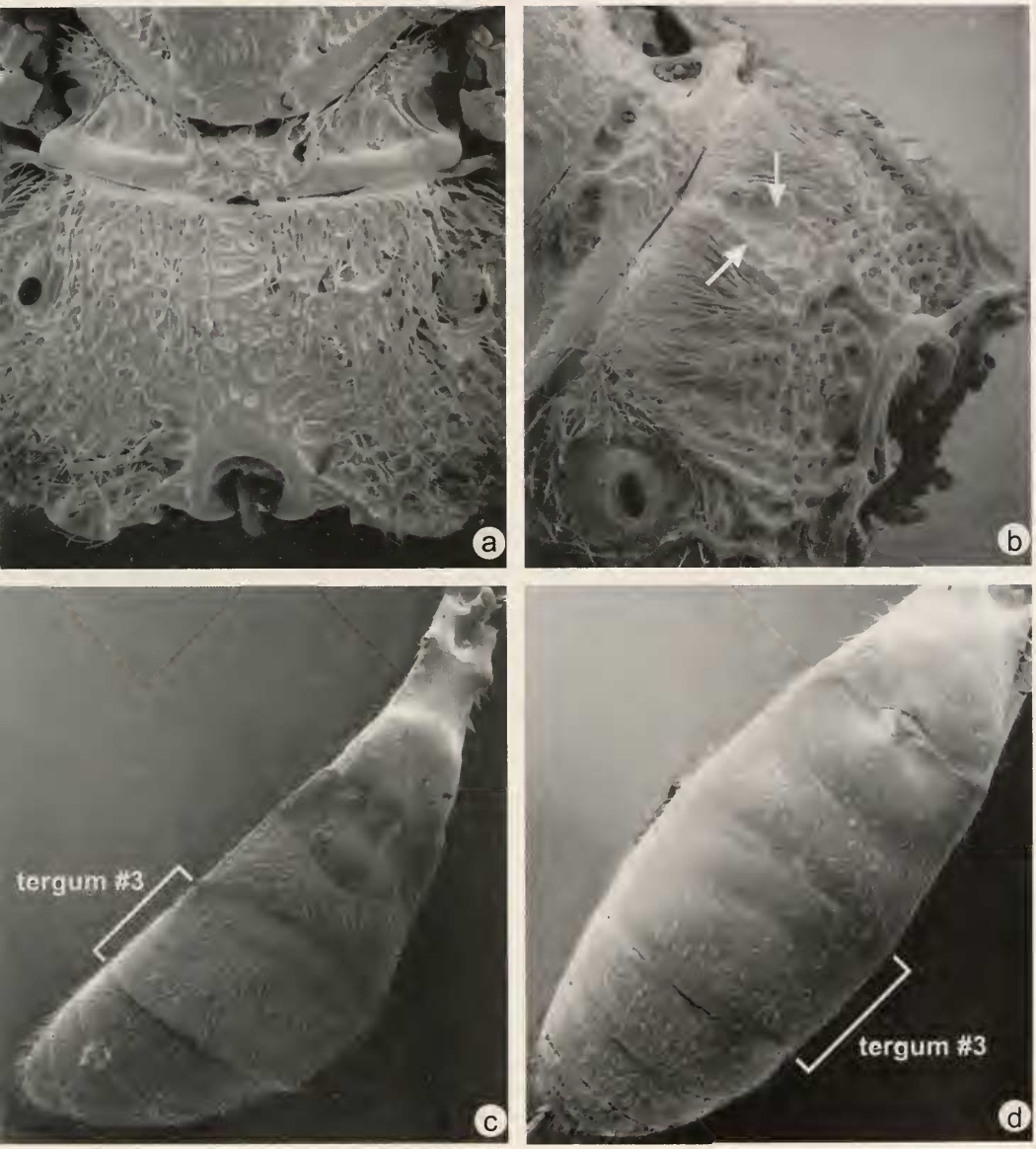


Fig. 6. *Agathirsia* spp. a, b, Propodea. a, *A. davidi*. b, *A. cressoni*. c, d, Abdominal terga. c, *A. trichiosoma*, d, *A. davidi*

in specimens in which the galea is significantly shorter than the long, exposed glossa (Fig. 4a). All of these species possess glossae that are more than 2 mm in length. Because it seems apparent that the glossa cannot fold or otherwise be contained within the galeae, nectar must travel from the apex to the base of the glossa itself. The glossa is strongly curved posteriorly along most of its length, thereby forming a tube. The outer surface of the tubular glossa is covered by scale-like setae (Fig. 8d). The presence of setae on outer surface of the glossal tube has two possible explanations. Jervis (1998) posited that these setae are hydrophylic and that the glossa is retracted into the galeae where the nectar is extracted. He suggest-

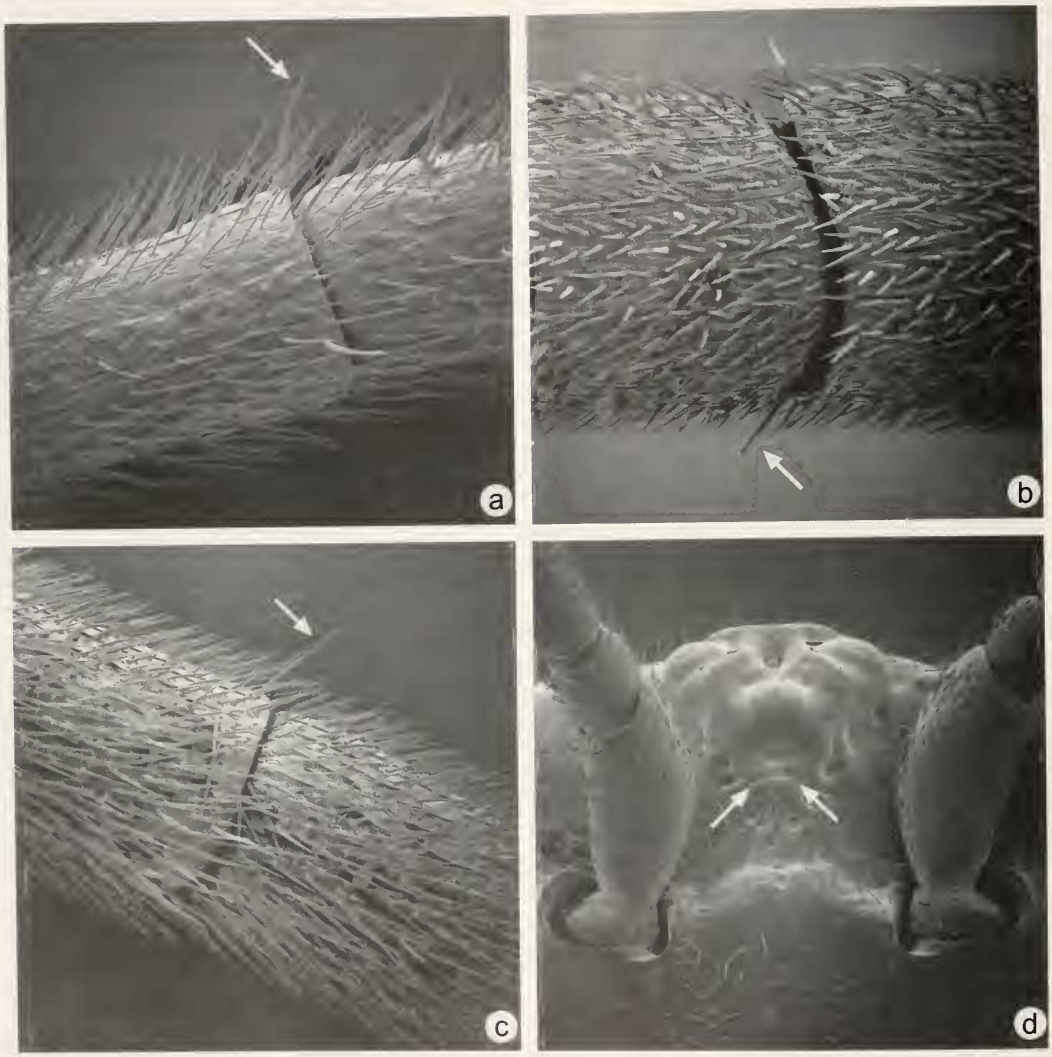


Fig. 7. *Agathirsia* spp., antennal setae. a, *A. asterophila*, showing long seta. b, *A. testacea*, showing short seta. c, *A. sericans*, showing seta of medium length. d, *A. testacea*, showing foveae around ocelli.

ed that the tube itself was used primarily to secrete salivary juices to dilute nectar in order both to pre-orally digest nectar and to optimize its viscosity. We cannot imagine how a glossa, that is frequently many times the length of the galeae, could be retracted to such a degree. There are no dried specimens that show partial retraction, and there are no apparent morphological structures, such as transverse striations on the glossa, that would allow the glossa to be folded into shorter sections. Therefore, contrary to Jervis (1998), we suggest that the scale-like, hydrophilic, setae on the outer surface of the glossa direct liquid toward the postero-medial longitudinal fissure where they are sucked into the lumen of the glossa and subsequently towards the oral cavity. This hypothesis requires that the glossa be able to open and close, at least part of its length, to allow liquid to enter. There are interesting

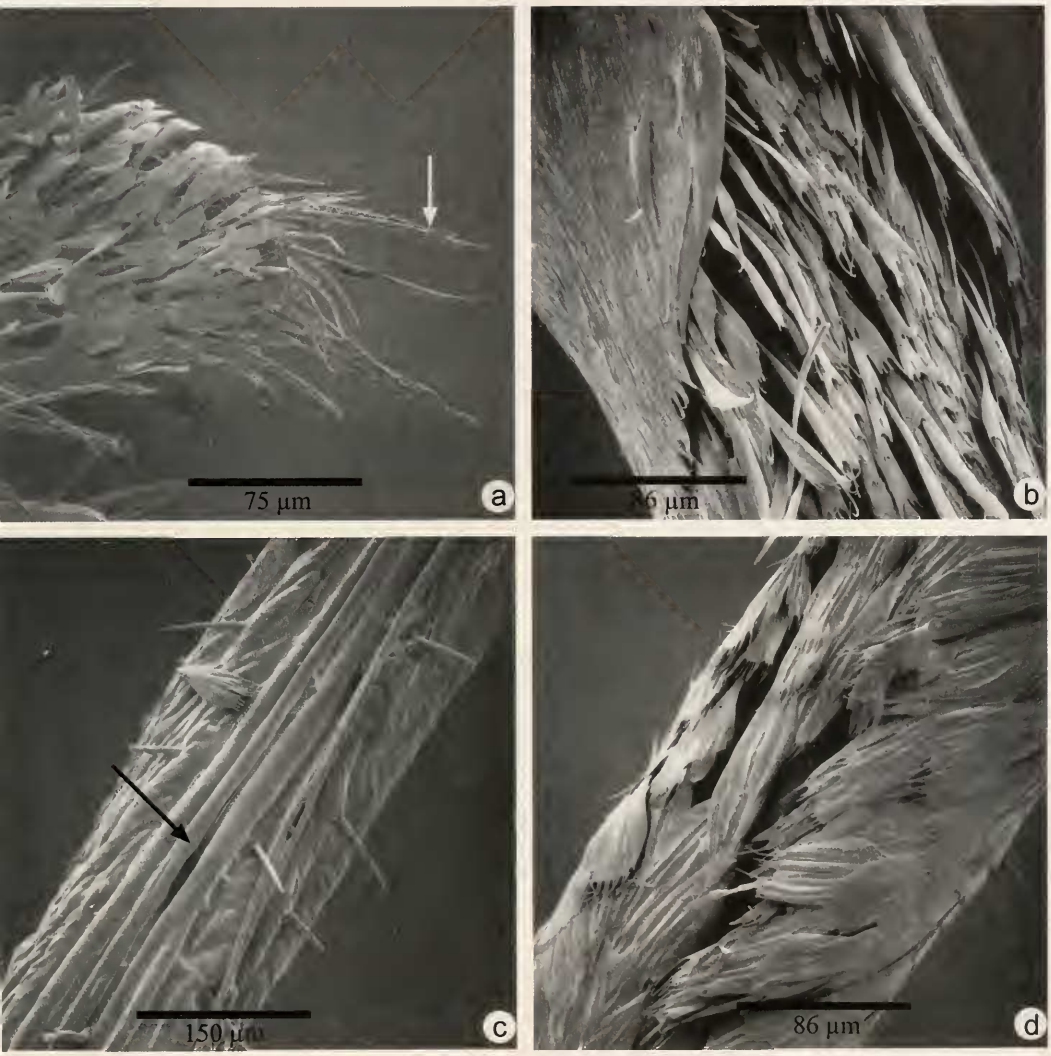


Fig. 8. *Agathirsia* spp., glossae. a, *A. testacea*, showing long terminal setae. b, *A. nigricauda*, close up of hydrophilic scales. c, *A. proxima*, showing longitudinal striations of inner surface. d, *A. proxima*, showing hydrophilic scales.

sensory setae along the length of the posterior fissure of the glossa (Fig. 9b) that may be responsible for signaling the presence or absence of liquid. While liquid is present the fissure should remain open, and when it is not present the fissure should collapse. The interior of the glossal tube is glabrous with longitudinal striations (Fig. 8c). These striations may allow the circumference of the tube to expand and contract to accommodate a greater or smaller flow of liquid. They may also function to strengthen the walls of the glossal tube so that they do not collapse when experiencing the negative pressure associated with sucking. This hypothesis does not negate the idea that the glossal tube may also be used to secrete salivary juices into nectaries.

A. jervisi Pucci and Sharkey is the only species with Jervis' type VI mouthparts. There is only one known specimen of this

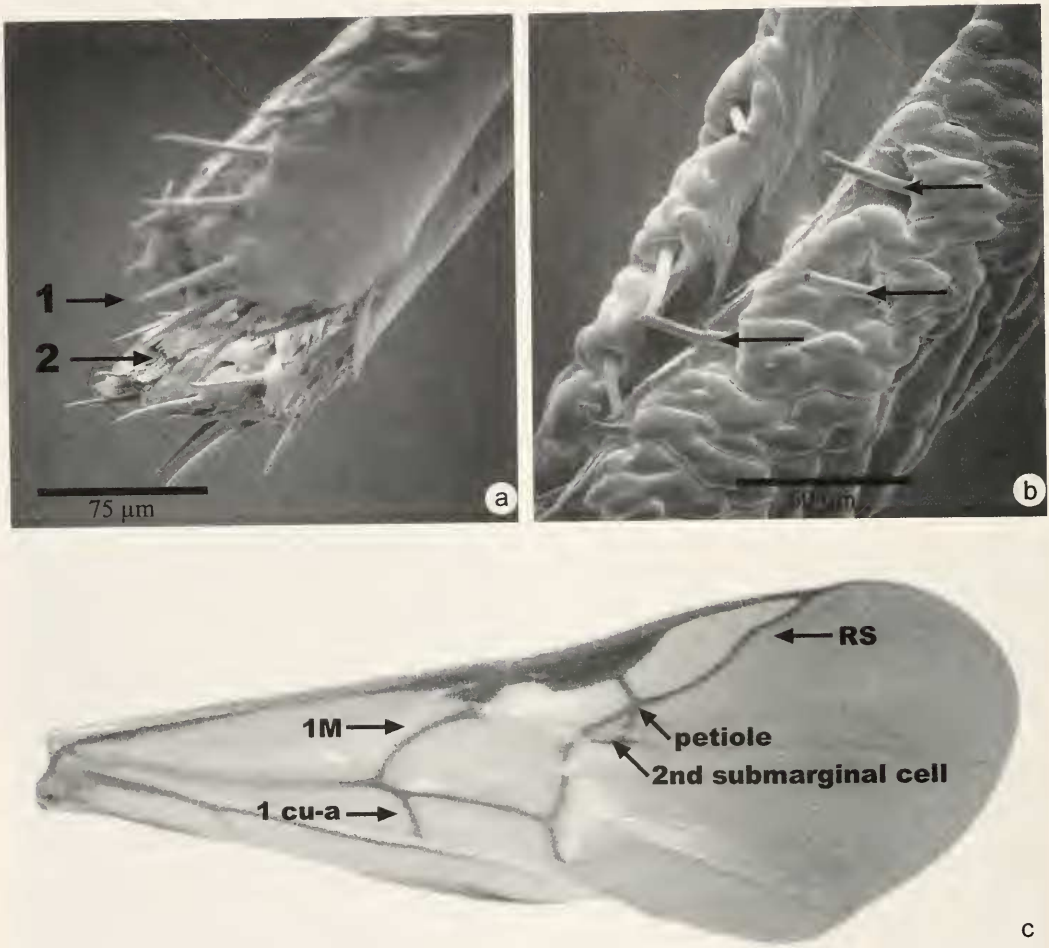


Fig. 9. *Agathirsia* spp., glossae. a, *A. nigricauda,* showing 1) long terminal setae, and 2) glossal scales. b, *A. proxima,* showing tube-like morphology and specialized setae. c, Forewing of *A. davidi*

species. One of its maxillary palps has only 4 palpomeres instead of the usual 5; the 4th and 5th are fused. The other palp has 5 palpomeres, the last being extremely small. Incredibly, the labial palpi are very long, 1.7 mm, and 5 segmented, instead of 4, which is ground-plan for the Hymenoptera. The last palpomere is very small and globose. Palpomeres 2–4 (and possibly 1) have the inner sides concave and hirsute. The glossa is hirsute, 1.2 mm, and sits between the labial palpi. The galea is much smaller than the glossa and we suspect that the setae on the glossa and inner surface of the labial palpi are hydrophilic and transport liquid along the length of the proboscis aided by negative pressure applied by the pharyngeal and cibarial pumps.

CLADISTIC SECTION

Methods.—The data matrix for the cladistic analysis is presented in Table 1. Characters 1 and 13–18 are treated as ordered. Character 13 is meristic and characters 14–18 are continuous. Median values were used when there was variation in these characters. A heuristic search was performed using PAUP* version 4.0b10 (Swofford 2002). Five hundred random

Table 1. Character matrix for species of *Agathirsia* and outgroups, including multiple species of *Crassomicrodus*.

	Discrete									Continuous and Meristic								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Pselaphanus trogoides	1	?	1	1	1	1	1	1	1	1	1	1	—	6	0	0	1	0
Earinus limitaris	1	2	1	1	1	1	1	1	1	1	1	1	—	6	0	5	2	1
Agathis arida	1	2	1	$	1	1	2	2	1	1	2	2	—	4	0	6	7	1
Agathis semiaciculata	1	2	1	2	1	1	2	2	1	1	2	2	—	6	0	6	9	2
Agathis malvacearum	1	2	1	$	1	1	2	2	1	1	2	2	—	5	0	9	4	1
Bassus sp.	1	1	1	1	1	2	1	1	1	1	2	2	—	8	1	2	4	1
Bassus brooksi	1	2	1	1	1	2	1	1	1	1	2	2	—	9	0	4	4	1
Crassomicrodus sp.	+	3	2	2	1	?	1	1	2	1	2	2	—	?	0	1	4	2
Crassomicrodus apicipennis	1	3	2	2	1	1	1	1	2	1	2	2	—	9	0	0	4	2
Crassomicrodus divisus	1	3	2	2	1	1	1	1	2	1	2	2	—	7	0	0	8	1
Crassomicrodus fenestratus	1	3	2	2	1	?	1	1	2	1	2	2	—	4	0	0	5	1
Crassomicrodus fulvescens	1	3	2	2	1	1	1	1	2	1	2	2	—	7	0	0	5	0
Crassomicrodus medius	1	3	2	2	1	1	1	1	2	1	2	2	—	8	0	0	4	2
Crassomicrodus muesebecki	+	3	?	2	1	1	1	1	2	1	2	2	—	8	0	1	3	1
Crassomicrodus nigriceps	1	3	2	2	1	1	1	1	2	1	2	2	—	6	0	0	4	2
Crassomicrodus nigrithorax	1	3	?	2	1	1	1	1	2	1	2	2	—	9	0	0	4	5
Crassomicrodus pallens	1	3	2	2	1	1	1	1	2	1	2	2	—	6	0	0	8	1
Agathirsia armandi	3	1	1	2	1	1	1	1	2	1	2	2	0	5	1	?	2	4
Agathirsia asterophila	2	1	1	2	1	1	1	1	2	2	2	2	2	0	0	0	0	5
Agathirsia bicolor	*	1	?	2	1	1	1	1	2	1	2	2	7	5	1	1	2	3
Agathirsia bifidilingua	3	1	?	2	1	1	1	1	2	1	2	2	5	5	2	3	4	5
Agathirsia campanisura	*	1	1	2	1	1	1	1	2	1	2	2	3	5	2	3	3	5
Agathirsia capillata	*	1	1	2	1	1	1	1	2	2	2	2	5	3	0	0	1	4
Agathirsia collini	*	1	1	2	1	1	1	1	2	?	2	2	1	5	1	2	2	2
Agathirsia cressoni	*	1	1	2	1	1	1	1	2	1	2	2	9	6	1	0	2	7
Agathirsia davidi	3	1	1	2	1	1	1	1	2	2	2	2	3	2	1	1	0	5
Agathirsia foveiseries	2	1	?	2	1	1	1	1	2	2	2	2	3	0	1	1	4	8
Agathirsia fulvocastanea	2	1	1	2	1	1	1	1	2	1	2	2	2	5	2	3	4	5
Agathirsia heleni	2	1	1	2	1	1	1	1	2	1	2	2	1	4	0	1	2	4
Agathirsia kellyi	2	1	1	2	1	1	1	1	2	1	2	2	0	3	1	?	1	3
Agathirsia kent	*	1	1	2	1	1	1	1	2	2	2	2	3	6	1	1	1	3
Agathirsia jervisi	2	1	1	?	2	1	2	1	2	1	2	2	1	5	3	0	1	8
Agathirsia longigladia	3	1	?	2	2	1	1	1	2	1	2	2	0	2	8	7	0	5
Agathirsia longilingua	*	1	1	2	2	1	1	1	2	1	2	2	6	6	9	4	4	3
Agathirsia michelei	3	1	1	2	1	1	1	1	2	?	2	2	3	4	2	4	3	9
Agathirsia minuata	*	1	?	2	1	1	1	1	2	1	2	2	0	4	0	0	4	2
Agathirsia nigricauda	3	1	1	2	1	1	1	1	2	1	2	2	8	4	2	1	2	7
Agathirsia ninesevensi	3	1	?	2	1	?	1	1	2	1	2	2	1	2	1	2	4	5
Agathirsia papoui	*	1	1	2	1	1	1	1	2	$	2	2	6	3	0	0	0	5
Agathirsia parkeningi	3	1	?	2	1	?	1	1	2	?	2	2	1	2	2	4	2	4
Agathirsia proxima	3	1	1	2	2	1	1	1	2	1	2	2	2	4	8	5	2	3
Agathirsia reai	3	1	1	2	1	1	1	1	2	1	2	2	0	5	2	5	3	5
Agathirsia rostrata	*	1	1	2	1	1	1	2	2	2	2	2	1	2	0	3	4	2
Agathirsia rufula	3	1	1	2	2	1	1	1	2	1	2	2	2	4	5	4	4	4
Agathirsia sericans	3	1	1	2	1	1	1	1	2	2	2	2	6	0	2	0	1	7
Agathirsia testacea	*	1	1	2	1	2	1	1	2	1	2	2	5	8	0	3	5	1
Agathirsia tiro	2	1	?	2	1	1	1	1	2	1	2	2	1	5	0	1	3	4
Agathirsia trichiosoma	*	1	1	2	1	1	1	1	2	2	2	2	3	0	0	0	0	6

? = unknown, e.g. could not be viewed on the specimen
+ = uncertainty between states 1 and 2, the state falls somewhere between the two states and is treated as polymorphic in the nexus file used for analysis
$ = polymorphic between states 1 and 2
* = polymorphic between states 2 and 3
– = not applicable

additions were carried out, each followed by TBR and unlimited maxtrees. The continuous characters were all scaled between 10 states (0–9) and could have a minimum of 9 steps. We down-weighted the continuous characters so that the total weight of each continuous character (99) was approximately equivalent to the total weight of a discrete binary character (100). This was accomplished by giving all continuous characters a weight of 11 and all binary characters a weight of 100. Trees were rooted with *Pselaphanus trogoides* Szépligeti due to its purported and supported sister-group relationship with Agathidinae (van Achterberg 1990). Before starting this revision we were uncertain of the monophyly of both *Crassomicrodus* and *Agathirsia* because testable synapomorphies had never been proposed for either genus. To test for the monophyly of *Agathirsia* and *Crassomicrodus* and to strengthen our outgroup analysis we included 10 species of *Crassomicrodus* as well as members of the genera *Agathis* and *Bassus*. The undescribed species of *Bassus (Bassus sp.)* was included because it has flattened pegs as do all species of *Agathirsia* and we were not sure to which genus it belonged. It was included to test the question of its placement in either *Bassus* or *Agathirsia*.

Character List.—

1. Mandible: 1- with well-developed second tooth (Figs. 1a, d); 2- with vestigial second tooth (Fig. 1b); 3- without second tooth (Fig. 1c). Twelve species of *Agathirsia* are polymorphic for states 2 and 3. Further observations of rare species will no doubt yield more taxa that possess both states. The second author suspects that the second mandibular tooth may be present in specimens of most species but that it is worn off in the process of digging through soil.

2. Apical pegs of the hind tibia: 1- flattened distally (Figs. 2b, c); 2- rounded distally (peg-like) (Fig. 2a); 3- hair-like (Fig. 2d). Although we have described state 3 as pegs "hair-like" we really do not know if the pegs are hair-like or if they are lost. Some of the "hairs" are thicker than others and this lead us to suggest that they are modified pegs but this is not a well corroborated conclusion. It may be more appropriate to describe the character state in *Crassomicrodus* as "without thickened peg-like setae" but the terminology makes no practical difference in the results of the analysis.

3. Foreclaw: 1- with basal lobe (Fig. 3a), 2- without basal lobe (Fig. 3c). Very tiny (vestigial) basal lobes (Fig. 3b) are coded as uncertain.

4. Two longitudinal carinae on first tergum extending past spiracles: 1- present; 2- absent. This character is variable within *Agathis* and the phylogeny of members of *Agathis* will have to be resolved before there can be confidence in our scoring of this taxon.

5. Quotient of galea divided by glossa: 1- more than 0.55 (Fig. 4b); 2- less than 0.40 (Fig. 4a). See the Mouthpart Morphology section for a more complete discussion. State 2 represents Jervis' Type IV mouthpart morphology described earlier.

6. Hind coxal cavity: 1- open; 2- closed.

7. Relative position of lateral ocelli and hind margin of eyes: 1- tangent with posterior margin of eyes; 2- anterad posterior margin of eyes. State 2 appears to be synapomorphy for members of *Agathis*. This state is associated with the forward migration of the ocelli due to invagination of the back of the head. The invagination allows the head to rotate anterodorsally into a prognathous position without the occiput hitting the pronotum. The prognathous position facilitates probing into deep floral nectaries.

8. Shape of the labrum: 1- oval; 2- circular. The elongation of the face in members of *Agathis* includes the elongation of the labrum which is therefore rather more circular than those of typical agathidines, which are significantly wider than long. This character state is also found in (the appropriately named) *Agathirsia rostrata*,

as well as most members of the Cremnoptini. The state is also scattered throughout the Microdini and Disophryini.

9. Mandible: 1- dorsoventrally flattened (Fig. 1a); 2- thick and relatively cylindrical (Figs. 1b-d). See Biology section for more information on mandible morphology.

10. Medial setae on tergum 3: 1- at most a fringe distally; 2- present distally as a wide, complete band (Figs. 6c, d). As mentioned previously, the extensive setosity may be effective in mimicking bees.

11. Second submarginal cell: 1- quadrate; 2- triangular (Fig. 9c). A quadrate cell is found in the outgroups *Pselaphanus* and *Earinus*. The character was included to add some resolution to the outgroup analysis.

12. Rs + M vein: 1- complete; 2- not complete (Fig. 9c). A complete Rs + M vein is found in the outgroups *Pselaphanus* and *Earinus*. The character was included to add some resolution to the outgroup analysis.

The following six characters are meristic or continuous and the absolute values are scaled between 0 and 9.

13. Number of distally flattened pegs on hind tibia. The number of pegs varies between 0–21.

14. Quotient of basal width of tergum 1 divided by length of tergum 1. Quotients are between 0.40–1.13.

15. Quotient of glossa length divided by foretibia length. Quotients are between 0.20–3.10. Because there are only a few species with exceptionally long tongues, most species clump between states 0 and 2.

16. Quotient of ovipositor length divided by foretibia length. Quotients are between 0.54–6.30.

17. Quotient of malar space length divided by eye height. Quotients are between 0.22–0.59.

18. Quotient of length of labial palpomere 2 divided by length of labial palpomere 4. Quotients are between 0.9–2.5.

Results.—Figure 10a shows the strict consensus tree of 32 minimum length trees (branches with a minimum length of zero collapsed), each with a weighted length of 4266 steps. The minimum length trees have the following values: consistency index 0.47, retention index 0.82, and rescaled consistency index 0.38. The characters mapped onto the consensus tree are those that are unequivocal over all primary trees, with two exceptions that are discussed below. In the following discussion the numbers in square brackets [ ] refer to character states.

The monophyly of *Agathirsia* is supported by one unequivocal autapomorphy, i.e., the reduction of the second mandibular tooth (Figs. 1 b, c) (character 1[2]). Most species lack a second mandibular tooth (Fig. 1c), although some still have a slight indication of the inner (ventral) tooth (Fig. 1b). The presence of a small ventral tooth appears as a reoccurrence of the tooth from an ancestral species of *Agathirsia* in which the tooth was absent. The presence of flattened pegs on the apicomedial surface of the hind tibia (Figs. 2b, c) (character 2[1]) is an autapomorphy implied by DELTRAN optimization only. The flattened pegs of the hind tibia are found convergently in the undescribed species of *Bassus* included in the analysis (*Bassus sp.*).

The sister-group relationship of *Crassomicrodus* + *Agathirsia* is supported by the robust cylindrical shape of the mandibles (character 9[2]), which appears to be a modification for digging in the soil.

The results of the cladistic analysis suggest two synapomorphies for members of *Crassomicrodus*. The first, which is implied exclusively by DELTRAN optimization, is that the apical pegs of the hind tibia are hair-like (Fig. 2d) (character 2[3]), unlike the standard agathidine pegs illustrated in figure 2a and unlike the flattened pegs of members of *Agathirsia* (Figs. 2b, c). A weakness with this proposed autapomorphy is that it rests on the assumption that the flattened pegs of *Agathirsia* and the

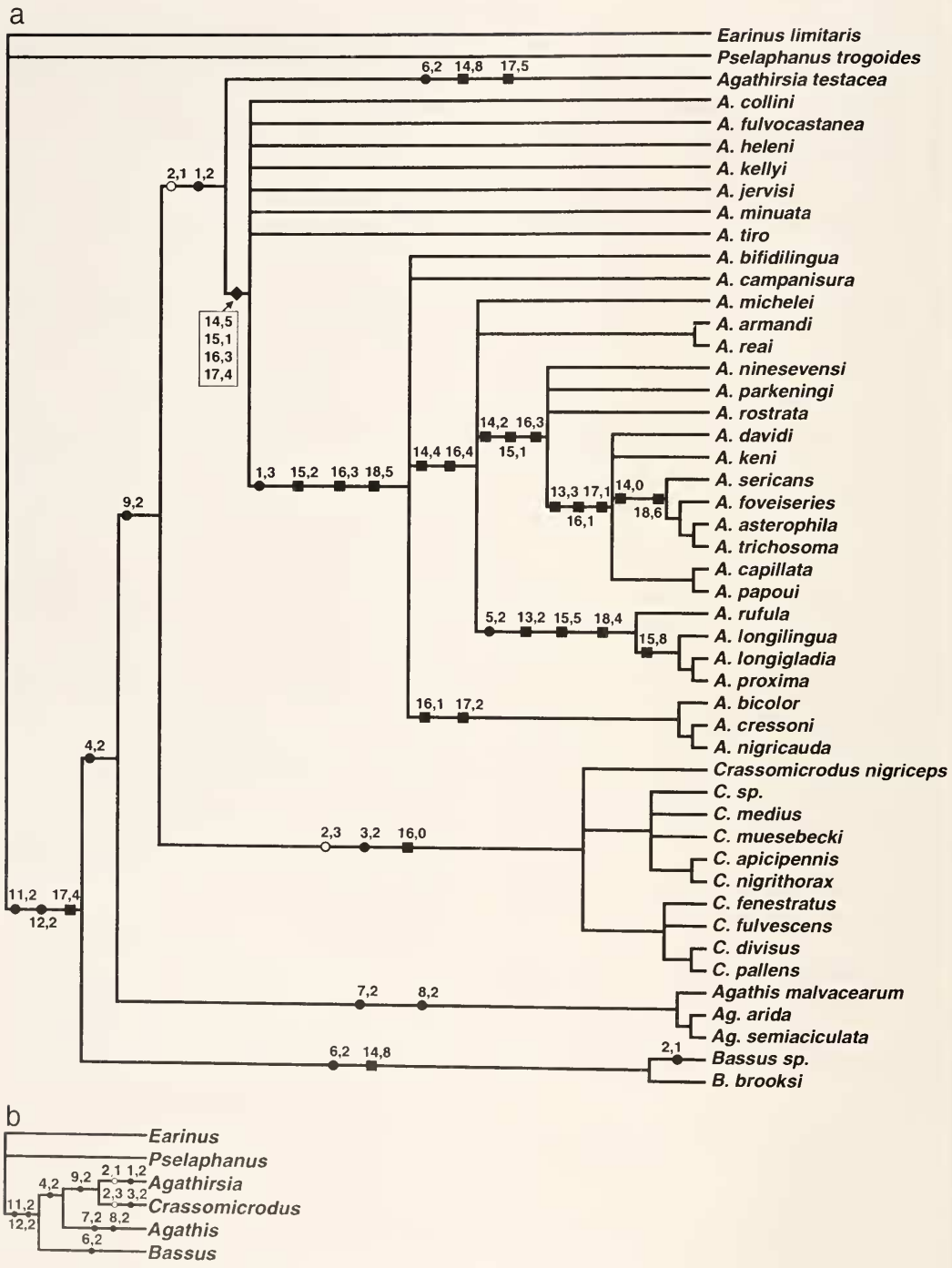


Fig. 10. *Agathirsia* spp. a, Strict consensus tree of species and outgroups employing all characters. b, Strict consensus tree using only discrete, non-meristic, characters.

hair-like spines of *Crassomicrodus* evolved independently from a peg-like ancestor. It is equally parsimonious to suggest that the flat pegs were derived from the hair-like spines or vice versa. The second proposed autapomorphy for *Crassomicrodus* is the loss of lobes at the base of the tarsal claws (character 3[2]) (Fig. 3c). The plesiomorphic condition, with a well-defined basal lobe, is shown in figure 3a. The loss of this lobe is also found in some members of the Earinini, and sporadically in other agathidines including some species of *Agathirsia*.

Autapomorphies for *Agathis* are the anterior placement of ocelli (character 7[2]) and shape of the labrum (character 8[2]). The closed hind coxal cavities appear as an autapomorphy for *Bassus* (character 6[2]). This result is a product of the abbreviated nature of this analysis. The closed coxal cavities are far more widespread in the Agathidinae, occurring in most Microdini, Cremnoptini and Disophryini. At present there is no evidence for the monophyly of *Bassus* though the two included species are part of a much larger monophyletic group.

Figure 10b illustrates the strict consensus tree generated when the meristic and continuous characters (characters 13–18) are excluded. In this simplified tree all polytomies have been collapsed. The discrete characters resolve the genera but do nothing to resolve the relationships within *Agathirsia*. All of the resolution within *Agathirsia* illustrated in figure 10a is the result of the addition of the meristic and continuous characters. Due to the limited number of discrete characters, and to the nature of ordered multistate characters, characters 13–18 would add much resolution even if they were totally random. To test whether or not the meristic and continuous characters have information content we randomized the meristic and continuous characters while holding the character state frequencies constant. If characters 13 to 18 have information content then the randomized characters that replace them should add significantly to the length of the tree. Characters 13–18 were randomized with "true random numbers" a program found at www.random.org. Rather than being replaced with completely random numbers, the states were rearranged to maintain the character state frequency, for example, if there were 3 cells with a score of 7 in the original matrix the random matrix would also contain 3 cells scored as 7. One hundred randomized datasets were generated and analyzed in Paup using TBR, unlimited Maxtrees, 50 random addition-sequence replicates with a time limit of 120 seconds on each replicate on a Pentium 4 1.8GHz processor. Taken as a whole, the characters are 43% longer when randomized than they are in the non-randomized results and they make the resulting minimum length trees an average of 21% longer.

Within *Agathirsia* several major clades supported by the continuous characters are worth discussing. *A. testacea* is the sister-taxon of the remainder of the species of *Agathirsia*. *A. testacea* is particularly interesting because it is the sole species with a large sclerite between the foramina of the metasoma and the hind coxa (character 6[2]). This putatively derived state is found convergently in the vast majority of *Bassus*, as well as most Microdini, Disophryini, and Cremnoptini. The monophyly of the remainder of the species is supported by four continuous characters. Moving up the tree there is a large polytomy of seven species and one large monophyletic group united by the complete loss of the second mandibular tooth and three continuous characters. Further up the tree there is a polytomy composed of four lineages. One of these clades contains all of the species with long glossae (Jervis Type IV). Because the independence of some of the characters is suspect, the monophyly of the group and the unique derivation of the elongate glossa

that this topology suggests are not considered well supported, though the observation that other characters do not imply other groupings indicates some support. What is interesting, and better supported, is the distant placement of *A. jervisi* relative to this clade, giving some confidence to the conclusion that the Jervis Type IV and Jervis Type VI mouth-parts are independently derived from type I mouth-parts.

DESCRIPTIONS AND KEYS

Agathidini Sharkey 1992

Diagnosis.—Members of the Agathidini may be distinguished from all other Agathidinae by the following combination of characters: Labio-maxillary complex usually (95%) elongate (galea longer than mandible) (Figs. 1a, 4a, b); labial palpomere 3 not reduced, more than 0.5 length of palpomere 4 (Figs. 4a, b); tarsal claws not cleft, i.e., without two sharp teeth; 1-Rs+M vein of forewing incomplete (Fig 9c); posterior transverse carina of propodeum absent; hind coxal cavity usually (80%) not separated from metasomal foramen, sometimes (20%) separated by narrow sclerite.

WORLD KEY TO THE GENERA OF AGATHIDINI + *BASSUS*

Notes: The limits of the Agathidini are based on Sharkey (1992). The genus *Bassus* belongs to the tribe Microdini (Sharkey 1992) but the genus is not well defined and can sometimes be confused with members of the Agathidini; it is therefore included in this key. If no characters in any particular side of a couplet are definitive then the reader should choose that alternative with the most applicable characters.

1. Wide transverse carina, i.e. more that $\frac{1}{5}$ as wide as long, between hind coxae **usually** (90%) present; hind coxa and metasoma **usually** separated by wide sclerite, rarely with a very narrow sclerite or none at all; galea **usually** (90%) shorter than mandible; third labial palpomere **usually** (90%) less than half the length of the fourth; propodeum **often** (70%) areolated ..... ***Bassus* Fabricius**
– Wide transverse carina between hind coxae **rarely** (1%) present, sclerite usually absent (90%) or very narrow, i.e. less that $\frac{1}{8}$ as wide as long, (9%); galea **usually** (99%) longer than mandible; third labial palpomere more than half the length of fourth (95%); propodeum not areolated ..... 2 (Agathidini)

2 (1) Mandible dorso-ventrally flattened (Fig. 1a); hind tibial spines peg-like (Fig. 2a); RS of forewing **usually** (90%) straight; second submarginal cell **usually** (90%) not petiolate; head excavated posteromedially and ocelli shifted anterad such that line drawn over lateral ocelli meeting the compound eyes; labrum **usually** (90%) almost as high as wide. ..... ***Agathis* Latreille**
– Mandible not flattened as above (Figs. 1b-d); hind tibial spines either somewhat flattened or hair-like (Figs. 2b-d); RS of forewing **usually** (90%) sinuate (Fig. 9c); second submarginal cell **usually** (90%) petiolate (Fig. 9c); head not excavated posteromedially and ocelli not shifted anterad such that a line drawn over lateral ocelli is approximately tangent with posterior margin of compound eyes; labrum **usually** (97%) distinctly wider than high 3

3 (2) Glossa **usually** (90%) at least as long as mandible; hind tibial pegs somewhat flattened (Figs. 2b,c); claws with distinct to vestigial basal lobe (Figs. 3a, b) ..... ***Agathirsia* Westwood**
– Glossa shorter than mandible; hind tibial pegs hair-like (Fig. 2d); claws with basal lobe absent (Fig. 3c) or **sometimes** (20%) vestigial ..... ***Crassomicrodus* Ashmead**

Agathirsia Westwood

Agathirsia Westwood 1882: 20. Type species *Agathirsia rufula* Westwood, designated by Viereck, 1914: 6. [Examined].

Agathona Westwood 1882: 22. Type species *Agathona sericans* Westwood, monobasic. Syn. by Szepligeti 1904: 128. [Examined].

Paragathis Ashmead 1889(1888): 638. Type species *Microdus thoracicus* [= *cressoni*] Cresson, monobasic. Syn. by Ashmead 1900: 128. [Examined].

Cenostomus Cameron 1905: 387. Type species, *Cenostomus trichiosomus* Cameron, by monotypy. **Syn. n.** [Examined].

Description.—Head: Gena lacking flange posteroventrally, posterolateral corner rounded to acute; mandible robust and cylindrical in cross-section (Figs. 1b,c); second tooth of mandible much reduced or absent (Figs. 1b,c); third (penultimate) labial palpomere more than half as long as last (distal) palpomere (Fig. 4a,b); frons not bordered with carinae; face not elongated into rostrum except for *A. rostrata*. *Mesosoma:* Notauli always impressed, foveolate to smooth (Figs. 5a,b); propodeum not evenly areolated, usually rugose to varying degrees (Figs. 6a,b); tarsal claws usually with basal lobe but sometimes lobe vestigial (Figs. 3a,b); hind tibia with small flattened pegs distally (Figs. 2b,c); second cubital cell of the forewing triangular and usually petiolate (Fig. 9c); wings transparent to infumate (Fig. 9c); hind coxal cavities open, sharing common opening with the metasoma except for *A. testacea*. *Metasoma:* First median tergite smooth, lacking sculpture, or pair of well-developed longitudinal carinae (Figs. 6c,d); ovipositor (when fully exerted) from 0.1 to 1.3× as long as the body.

TRANSFER OF *CRASSOMICRODUS PUMILUS* TO *BASSUS PUMILUS*

One of the species of *Crassomicrodus* that we investigated is clearly misplaced and is here transferred to *Bassus*. The fact that it is from South Africa was the first clue suggesting that it was misassigned to *Crassomicrodus*. Originally placed in the genus *Epimicrodus* by Szepligeti (1913), it was transferred to *Crassomicrodus* when Brues (1924) synonymized *Epimicrodus* under *Crassomicrodus*. The name *Bassus pumilus* is available. The specific name is occupied in *Agathis*, i.e., *Agathis pumila* (Ratzeburg), and rationale for its placement in *Agathis* (as opposed to *Bassus*) are discussed by Sharkey (1985, 1992).

Bassus pumilus (Szepligeti), n. comb.

Epimicrodus pumilus Szepligeti 1913: 385; (DEIC). [Examined].

Crassomicrodus pumilus Brues 1924: 144.

The following description is not meant to be exhaustive but rather to support the placement of the species in *Bassus*.

Penultimate labial palpomere (number 3) half the length of number 2; mandible narrow and scissor-like; occiput not dorsally excavated as in *Agathis*; propodeum sharply declivous, with strong posterior transverse carinae; hind coxal cavity closed; tergum 1 striate; metasomal terga wide; hind tibial pegs peg-like; claws with basal lobes present and sharply angled; forewing 3Rs decurved as in *Bassus conspicuus* (Wesmael); hind wing 2Cub tubular; ovipositor approximately 0.8× body length.

KEY TO FEMALES AND MALES OF *AGATHIRSIA*

Note: An interactive version of this key with color illustrations is available at www.uky.edu/~mjshar0, it is much simpler to use primarily due to its use of color characters, nonetheless the following key is effective in distinguishing species.

1 Labial palpi elongate, concave, and encasing glossa ..... *A. jervisi*

– Labial palpi not as above, not encasing glossa (as in Fig. 4b) 2

2 (1) Glossa more than 2× longer than galea (as in Fig. 4a) 3
– Glossa less than 2× longer than galea (as in Fig. 4b) 6
3 (2) Hind femur black; metasomal terga entirely black; propodeum entirely black; notauli foveate (as in Fig. 5a) 4
– Hind femur orange; metasomal terga not entirely black; propodeum partially or entirely orange; notauli lacking foveae (as in Fig. 5b) 5
4 (3) Number of thick, apically flattened pegs on apex of hind tibia (as in Figs. 2b,c) six or less; tarsal claws with vestigial basal lobes (as in Fig. 3b); ovipositor length more than 6× hind basitarsus length ..... *A. longigladia*
– Number of thick, apically flattened pegs on apex of hind tibia (as in Figs. 2b,c) more than six; tarsal claws with distinct basal lobes (as in Fig. 3a); ovipositor length less than 6× hind basitarsus length ..... *A. longilingua*
5 (3) Foveae of sternaulus present for at least one third length of mesopleuron (as in Fig. 5a); glossa length less than 3mm ..... *A. rufula*
– Foveae of sternaulus restricted to extreme posterior of mesopleuron (Fig. 5c); glossa length at least 3mm ..... *A. proxima*
6 (2) Pair of lobes between midcoxae (Fig. 5d) ..... *A. testacea*
– Without pair of lobes between midcoxae 7
7 (6) With the following combination of characters: first tergum lacking black color basally; hind tibia lacking black color; at least 9 thick, apically flattened hind tibial pegs (as in Fig. 2b) 8
– Not exactly as above 9
8 (7) Dorsal metasoma usually orange basally and completely black for distal one third; hind femur orange; glossa length 0.68–0.95× foretibia length ..... *A. nigricauda*
– Tergum 1 black distally; remaining dorsal metasoma usually orange with transverse black bars; hind femur usually (~90%) black; glossa length 0.60–0.69× foretibia length ..... *A. cressoni*
9 (7) Hind femur entirely to mostly black 10
– Hind femur entirely to mostly orange 20
10 (9) Metasomal terga entirely black 11
– Metasomal terga with at least some orange or yellow 15
11 (10) Foveae present between tentorial pit and antennal insertion (Fig. 3d) ..... *A. rostrata*
– Foveae absent between tentorial pit and antennal insertion 12
12 (11) Setae on propodeum present along midline; ovipositor length greater than 3× hind basitarsus length ..... *A. parkeningi*
– Setae on propodeum absent along midline (as in Figs. 6a,b); ovipositor length less than 3× hind basitarsus length 13
13 (12) Setae on tergum 3 dense distally (as in Fig. 6c); ovipositor shorter than length of hind basitarsus ..... *A. capillata*
– Setae on tergum 3 not dense distally (as in Fig. 6d); ovipositor longer than hind basitarsus length 14
14 (13) Propodeum with pronounced rugosity near midline (as in Fig. 6b); distal half of hind tibia entirely black ..... *A. keni*
– Propodeum without pronounced rugosity near midline (Fig. 6a); distal half of hind tibia not entirely black ..... *A. davidi*
15 (10) Mesoscutum entirely black 16
– Mesoscutum partially to entirely orange 19
16 (15) Setae on propodeum present along midline 17
– Setae on propodeum absent along midline (as in Figs. 6a,b) 18
17 (16) Glossa length greater than 0.75× foretibia length; basal lobe of claw not large (smaller than Fig. 3a) ..... *A. sericans*
– Glossa length less than 0.75× foretibia length; basal lobe of claw large (Fig. 3a) ..... *A. trichiosoma*

18 (16) Setae on tergum 3 dense (as in Fig. 6c) and present on at least distal 0.75 . . . *A. sericans*
– Setae on tergum 3 not dense and present on less than distal 0.75 (as in Fig. 6) . . . . . *A. asterophila*
19 (15) Foveae of sternaulus present for at least one third length of mesopleuron (as in Fig. 5a); ovipositor length equal or shorter than length of hind basitarsus; setae on tergum 3 dense (as in Fig. 6c) and present on at least distal 0.75 . . . . . *A. sericans*
– Foveae of sternaulus restricted to extreme posterior of mesopleuron (as in Fig. 5c); ovipositor more than 2× length of hind basitarsus; setae on tergum 3 not dense and present on less than distal 0.75 (as in Fig. 6d) . . . . . *A. bifidilingua*
20 (9) Mesoscutum entirely black 21
– Mesoscutum partially to entirely orange or brownish orange 28
21 (20) Metasomal terga entirely black 22
– Metasomal terga partially to entirely orange or brownish orange 25
22 (21) Labial palpomere 2 at least equal to combined length of palpomeres 3 + 4 (as in Fig. 4b) 23
– Labial palpomere 2 shorter than combined length of palpomeres 3 + 4 24
23 (22) Glossal length more than 0.75× foretibia length; ovipositor length more than 3x hind basitarsus length . . . . . *A. michelei*
– Glossal length less than 0.75× foretibia length; ovipositor length less than 2x hind basitarsus length . . . . . *A. papoui*
24 (22) Notauli lacking foveae (as in Fig. 5b); longest setae at midlength of antenna approximately equal to antennal width (as in Fig. 7a) . . . . . *A. kellyi*
– Notauli foveate (as in Fig. 5a); longest setae at midlength of antenna less than 0.5× antennal width (as in Fig. 7b) . . . . . *A. collini*
25 (21) Labial palpomere 2 shorter than combined length of palpomeres 3 + 4 26
– Labial palpomere 2 approximately equal to combined length of palpomeres 3 + 4 (as in Fig. 4b) . . . . . *A. michelei*
26 (25) Claws with basal lobe distinct (as in Fig. 3a); propodeum largely sculptured and setae present except along midline (as in Figs. 6a,b); ovipositor distinctly longer than mesosoma . . . . . *A. campanisura*
– Claws with basal lobe vestigial (as in Fig. 3b); propodeum largely smooth and glabrous medially; ovipositor shorter than mesosoma 27
27 (26) Sternaulus with foveae restricted to extreme posterior of mesopleuron (as in Fig. 5c); glossal length more than 0.5× foretibia length; longest setae at midlength of antenna less than 0.5× antenna width (as in Fig. 7b) . . . . . *A. ninesevensi*
– Sternaulus completely foveate for entire length of mesosoma; glossal length less than 0.5× foretibia length; longest setae at midlength of antenna approximately equal to antenna width or longer (as in Fig. 7a) . . . . . *A. tiro*
28 (20) Area between tentorial pit and antennal insertion with line of foveae (as in Fig. 3d) . . . . . *A. foveiseries*
– Area between tentorial pit and antennal insertion without line of foveae 29
29 (28) Propodeum entirely black 30
– Propodeum partially or entirely orange 32
30 (29) Propodeum smooth along midline; tarsal claws with basal lobes distinct (as in Fig. 3a) . . . . . *A. heleni*
– Propodeum sculptured along midline (as in Fig. 6a); claw with basal lobe variable . . . 30
31 (30) Labial palpomere 2 approximately equal to combined length of palpomeres 3 + 4 (as in Fig. 4b) . . . . . *A. armandi*
– Labial palpomere 2 shorter than combined length of palpomeres 3 + 4 . . . . . *A. bicolor*
32 (28) Head entirely orange; glossal length shorter than 0.5× foretibia length; ovipositor less than 1.5x hind basitarsus length . . . . . *A. minuata*
– Face and frons at least partially black; glossal length more than 0.5× foretibia length; ovipositor longer than 1.5× hind basitarsus length 33

33 (32) Forecoxa and midcoxa orange; first tergum orange ..... *A. reai*
– Forecoxa and midcoxa black; first tergum black basally ..... *A. fulvocastanea*

Agathirsia armandi Pucci and Sharkey, sp. n.

Distribution (Fig. 11j).—Known only from the type locality in Puebla, Mexico.

Males.—Color: Orange and black, orange except as follows: antenna black; maxillary and labial palpomeres partly black; head except clypeus black; pronotum black ventrally; propleuron black; mesoscutum sometimes slightly black anteriorly; mesopleuron mostly black except slightly orange anteriorly; metanotum sometimes with black laterally; metapleuron black; propodeum black; hind tarsus sometimes dark orange; first tergum black; remaining terga dark orange with black mottling; wings slightly infumate. *Body length:* excluding ovipositor 6.6–7.0. *Head:* Longest seta at midlength of antenna approximately half or slightly less than half antenna width (as in Figs. 7b,c); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.33–0.40; glossa length less than 2× galea length; glossa length 0.83–0.90; glossa length 0.64–0.83× shorter than foretibia length; malar space 0.41–0.42× shorter than eye height; face above clypeus with distinct or vestigial longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose, setae present except along midline and posterior central area (as in Fig. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws small (cf. Figs. 3a,b); number of thick, apically flattened apical pegs on hind tibia 0–4; hind basitarsus straight; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.76–0.82× length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove distinct or vestigial.

Female.—Unknown.

Specimens examined.—Holotype: ♂, Mexico, Puebla, 3 mi. N Petalcingo, viii.21.1963 (Parker & Stange) (USNM). Paratype: 1 ♂, same data as holotype (USNM).

Remarks.—Similar to *A. heleni* and *A. bicolor*—see characters in the key and remarks under those species.

Etymology.—In honor of the senior author's father.

Agathirsia asterophila Pucci and Sharkey, sp. n.

Distribution (Fig. 11b).—Southwestern Mexico.

Females and males.—Color: Mostly black except as follows: maxillary and labial palpomeres partly pale; fore and midfemur with small orange area distally; foretibia sometimes entirely or partly pale yellow/orange; foretarsus sometimes entirely or partly pale yellow; midtibia partly pale yellow; midtarsus sometimes pale; hind tibia pale basally, pale color extending further laterally; hind tarsus sometimes partly or entirely pale yellow; first and second terga both yellow basally; wings slightly infumate. *Body length:* excluding ovipositor 8.2–10.3. *Head:* Longest seta at midlength of antenna subequal to antenna width (as in Fig. 7c); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible with or without indication of second tooth (as in Fig. 1b,c); glossa fork length 0.13–0.17; glossa length less than 2× galea length; glossa length 0.57–0.61; glossa length 0.38–0.42× shorter than

oretibia length; malar space 0.23–0.29× horter than eye height; face above clype- us with or without median longitudinal arinae; area anterior to ocellus with pits orming V-shape (as in Fig. 7d); area be- ween tentorial pit and antennal insertion vithout line of foveae. *Mesosoma:* Notauli oveate and complete (as in Fig. 5a); pro- odeum rugose posteriorly, foveate ante- iorly, setae present except along midline nd posterior central area (as in Fig. 9a,b); ternaulus foveate (as in Fig. 5a); mesepis- ernum without lobes between midcoxae; asal lobe of claws distinct (as in Fig. 3a); umber of thick, apically flattened apical egs on hind tibia 3–8; hind basitarsus ta- ered distally; 1-cu-a and 1-M of forewing eparated by a distance greater than 2 vein vidths (as in Fig. 9c). *Metasoma:* Posterior vidth of first tergum 0.40–0.50× shorter han length of first tergum; setae on ter- um 3 not dense (as in Fig. 6d), present n distal one third; tergum 3 with trans- erse groove distinct or vestigial; ovipos- or length 1.0–1.2; ovipositor length 0.67– .92× shorter than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mex- co, Morelos, 3.8 mi. W Yautapec, 3800′, iii.17.1962 (Ordway) (SEMC). Paratypes: **Mexico:** Guerrero: 1♂, 10.3 mi. S. Iguala, ii.23.1981 (Bogar, Schaffner, & Friedlan- er) (TAMU); Jalisco: 1♂, 16 km N Autlan, ii.31.1978 (Plitt & Schaffner) (TAMU); ♂, 16 km N Autlan, vii.31-viii.2.1978 Plitt & Schaffner) (TAMU); 1♀, 28 mi. E Guadalajara, viii.15.1962 (CNCI); Morelos: ♂, Cuernovaca [Cuernavaca], viii.15.1954 Dreisbach) (MSUC); 1♂, as previous AEIC); 1♂, 12 mi. E Cuernavaca, elev. 200′, viii.12.1954 (Dreisbach) (AEIC); 1♀, 2 mi. E Cuernavaca, elev. 4300′, iii.14.1954 (Univ. Kans. Mex. Expedition) SEMC); 1♀, 11 mi. S Tlaltizapan, iii.16.1962 (Roberts & Marston) (SEMC); ♀, 1♂, same data as holotype (SEMC); ♀, 2mi. W. Zacatepec, vii.28.1967 (R.H. & .M. Painter) (AEIC); Puebla: 1♀, Chietla, iii.13.1991 (Pena) (ATAM).

Remarks.—Similar to *A. sericans* and *A. trichiosoma*—see characters in the key.

Etymology.—Lover of aster—referring to the Asteraceae pollen commonly attached to specimens. Pollen identified by Gretchen Jones USDA, ARS, APMRU, College Station, TX.

Agathirsia bicolor Pucci and Sharkey, sp. n.

Distribution (Fig. 11h).—Known from two localities in Chihuahua, Mexico.

Females and males.—Color: Black and orange; variable, black except as follows: maxillary and labial palpomeres mostly orange; clypeus sometimes orange ventrally; pronotum entirely orange to slightly black ventrally; propleuron sometimes black and orange; mesoscutum and scutellum orange; mesopleuron black and orange; metanotum partly to entirely orange; propodeum black or black and orange; metapleuron black or black and orange; legs orange except tarsi orange to pale yellow; forewing clear in basal half, infumate in distal half; first tergum orange distally; remaining terga orange, sometimes with dark orange mottling; hind wing clear to slightly infumate in basal half and distinctly infumate in distal half. *Body length:* excluding ovipositor 7.7–8.5. *Head:* Longest seta at midlength of antenna approximately half or < half antenna width (as in Figs. 11b,c); labial palpomere 2 shorter than combined length of 3 + 4; mandible with indication of second tooth vestigial (as in Fig. 1b) or absent (as in Fig. 1c); glossa fork length 0.32; glossa length less than 2× galea length; glossa length 0.74; glossa length 0.53× shorter than foretibia length; malar space 0.40–0.43× shorter than eye height; face above clypeus without or with vestigial longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose, setae present ex-

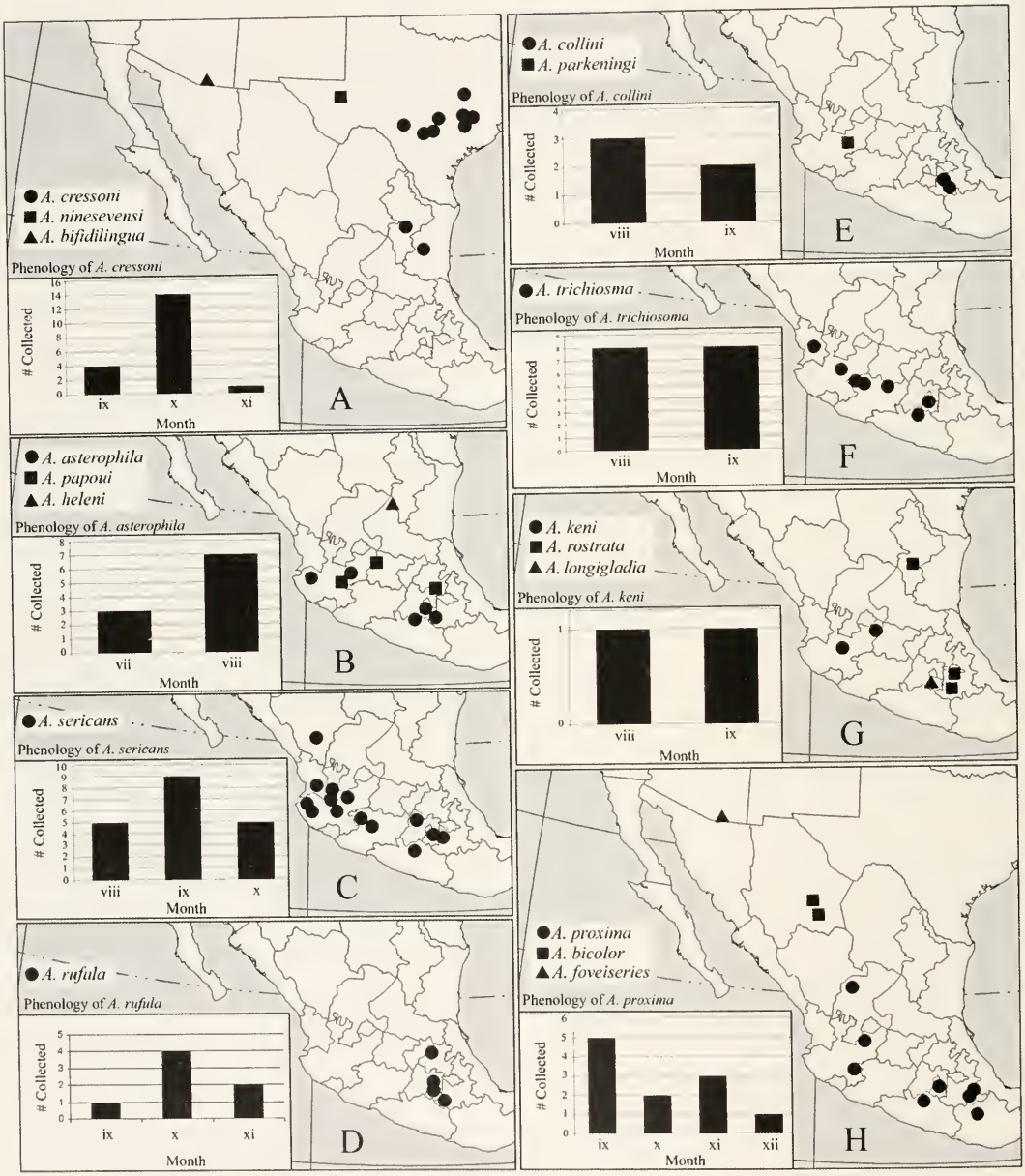


Fig. 11. *Agathirsia* spp., distributions and phenologies of selected species.

cept along midline and posterior central area (as in Fig. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 11–15; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.75–0.91× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove absent or vestigial; ovipositor length 2.1–2.3; ovipositor length 1.8–1.9× longer than hind basitarsus length.

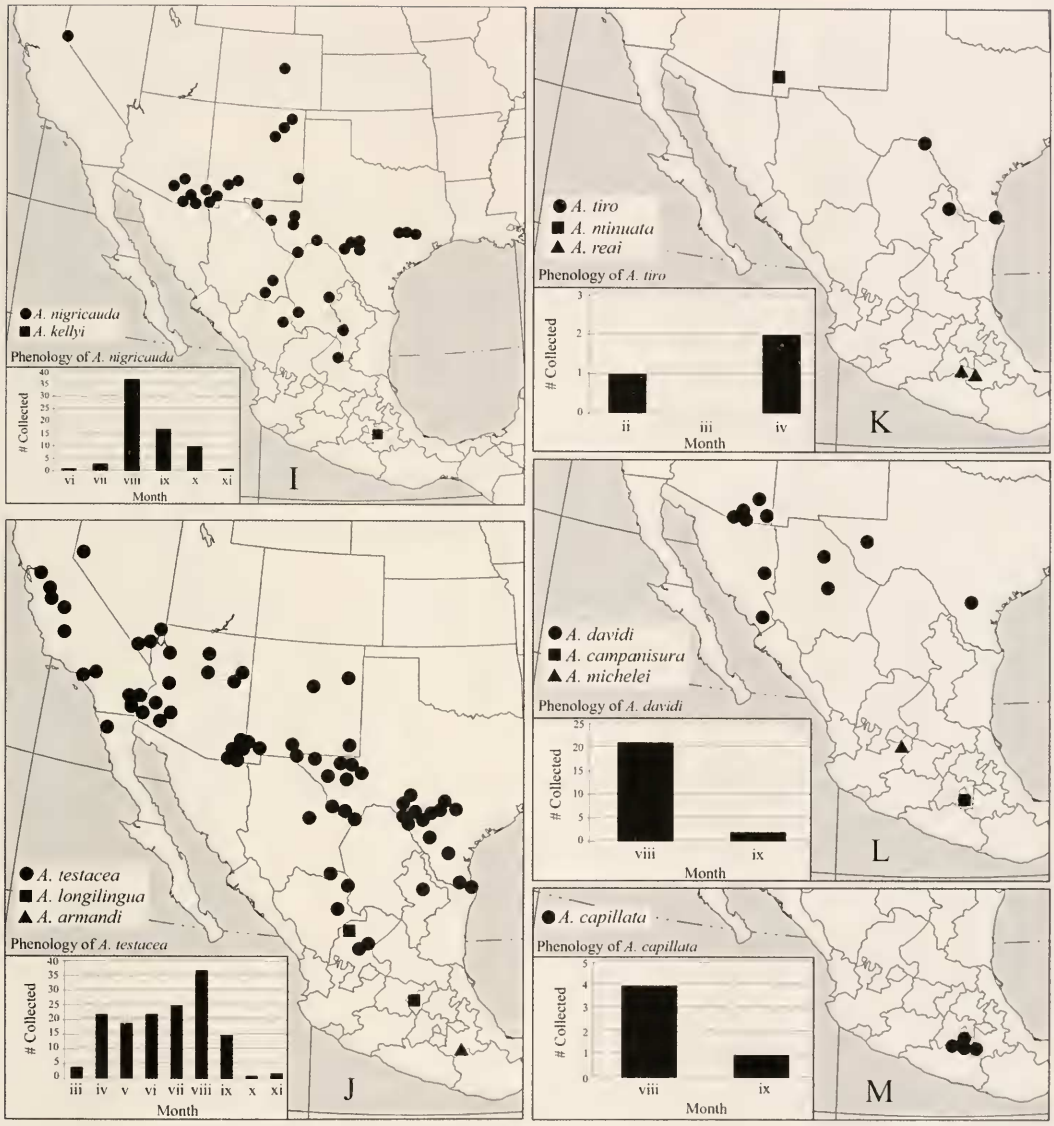


Fig. 11. Continued.

Specimens examined.—Holotype: ♀, Mexico, Chihuahua, 16 km N Cd. Jimenez, viii.26.1991 (Griswold) (CNCI). Paratypes: 1♀, 1♂, same data as holotype (CNCI); 1♀, same data as holotype except viii.27.1991 (CNCI).

Remarks.—Similar to *A. heleni* and *A. armandi*—see characters in the key and remarks under those species. *A. bicolor* is longer than *A. heleni* and *A. armandi* but overlap is possible considering the limited number of specimens measured. The basal lobe of the claw is vestigial (Fig. 3b) unlike the other two species.

Etymology.—Two colors—referring to the orange and black coloration.

Agathirsia bifidilingua Pucci and Sharkey, sp. n.

Distribution (Fig. 11a).—Known only from type locality in Arizona.

Holotype female.—Color: Mostly black

with some orange; orange as follows: pronotum dorsally; mesoscutum; scutellum partly orange; mesopleuron with orange area under sternaulus; fore and midlegs with some orange; forewing slightly infumate in basal half, infumate in distal half; hind wing clear in basal half, infumate in distal half. *Body length:* excluding ovipositor 9.4. *Head:* Longest seta at midlength of antenna approximately half antenna width (as in Fig. 7c); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.50; glossa length less than 2× galea length; glossa length 1.0; glossa length 0.77× shorter than foretibia length; malar space 0.54× shorter than eye height; face above clypeus with vestigial median longitudinal carinae; area anterior to ocellus without pits forming V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli very weak and absent anteriorly; propodeum mildly rugose, midline mostly smooth, setae present except along midline (similar to Fig. 6a); sternaulus slightly impressed with only a few foveae posteriorly (as in Fig. 5c); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 7–12; hind basitarsus tapered distally; 1-cu-a and 1-M in forewing partially or nearly overlapping. *Metasoma:* Posterior width of first tergum 0.80× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 4.3; ovipositor length 3.9× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, USA, Arizona, Pima Co., 12 mi. E Tucson, iv.13.1957 (USNM).

Remarks.—The combination of an orange mesoscutum and black legs is enough to distinguish this species from all other known *Agathirsia.* The collection date in April is much earlier than most species of *Agathirsia.*

Etymology.—Forked tongue—referring to glossa shape.

Agathirsia campanisura Pucci and Sharkey, sp. n.

Distribution. (Fig. 11l).—Known only from type locality in Morelos, Mexico.

Holotype female.—Color: Black and orange. Black except orange as follows: maxillary and labial palpomeres mostly orange; clypeus partially orange ventrally; forecoxa and foretrochanter partially orange; remainder of foreleg orange; midleg orange; hind leg orange except hind tarsus black and orange; terga orange except black mottling; wings slightly infumate. *Body length:* excluding ovipositor 7.3. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 shorter than combined length of 3 + 4; mandible with indication of second tooth (as in Fig. 1b); glossa fork length 0.30; glossa length less than 2× galea length; glossa length 1.0; glossa length 0.77× shorter than foretibia length; malar space 0.46× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus without pits forming V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate anteriorly, barely impressed as smooth groove posteriorly; propodeum foveate, rugose posteriorly to spiracles, shallow medial longitudinal furrow partially smooth, setae present except along midline and posterior central area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 5–8; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.78× shorter than length of first ter-

gum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove vestigial; ovipositor length 4.3; ovipositor length 4.6× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, Mexico, Morelos, Yautepec, vii.31.1963 (Parker & Stange) (USNM).

Remarks.—Similar to *A. ninesevensi*—see characters in the key. These two species also differ in the distance 1-cu-a and 1-M are from each other, however, intraspecific variation, when it is better understood, may make this character of limited value.

Etymology.—Bell calf—referring to the dilated hind tibia and narrow basitarsus.

Agathirsia capillata Pucci and Sharkey, sp. n.

Distribution (Fig. 11m).—South-central Mexico.

Females and males.—Color: Mostly black with some orange to yellow markings. Black except as follows: forefemur, tarsus, and tibia with some orange or pale yellow; midfemur mostly black, slightly orange distally; midtibia black and pale yellow to orange; midtarsus black and pale yellow; hind femur black or with some orange distally; hind tibia pale yellow basally and medially, hind tarsus black and orange to pale yellow; wings clear to slightly infumate. *Body length:* excluding ovipositor 7.2–8.0. *Head:* Longest seta at midlength of antenna approximately half antenna width (as in Fig. 7c); labial palpomere 2 subequal or shorter than combined length of 3 + 4; mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.17–0.18; glossa length less than 2× galea length; glossa length 0.49–0.64; glossa length 0.36–0.47× shorter than foretibia length; malar space 0.34–0.38× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a) or absent posteriorly; propodeum mildly rugose posteriorly mildly foveate anteriorly, shallow furrow along midline mildly sculptured, setae present except along midline and posterior central area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 7–11; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.61–0.74× shorter than length of first tergum; setae on tergum 3 long and dense on distal half (as in Fig. 6c); tergum 3 with transverse groove; ovipositor length 0.90–0.98; ovipositor length 0.68–0.89× shorter than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Morelos, 12 mi. E Cuernavaca, 4300′, viii.14.1954 (Chillcott) (AEIC). Paratypes: **Mexico:** Guerrero: 1♀, 33 mi. N Taxco, elev. 5700′, viii.29.1963 (Scullen & Bolinger) (OSUO); Morelos: 1♀, 3 mi. NW Tequesquitango, viii.16.1962 (Roberts & Martson); 1♀, same data as holotype (AEIC); 1♂ [metasoma missing] same data as holotype except collector (Univ. Kans. Expedition) (SEMC); 1♀, 45 mi. S Cuernavaca, elev. 4300′ ix.12.1957 (Scullen) (CNCI); Puebla: 1♂, 5 mi. S Izucar de Matamoros, viii.1.1963 (USNM).

Remarks.—Similar to *A. davidi, A. keni* and *A. parkeningi*—see characters in the key and remarks under *A. parkeningi.* In addition, *A. capillata* has longer setae throughout the body and reduced sculpture on the propodeum and pronotum compared to *A. davidi* (Fig. 5a) and *A. keni.*

Etymology.—Hairy—referring to the long and extensive setae.

Agathirsia collini Pucci and Sharkey, sp. n.

Distribution (Fig. 11e).—South-central Mexico.

Females and males.—*Color:* Mostly black with some orange or light brown as follows: maxillary and labial palpomeres mostly orange; foretrochantellus orange or brown; forefemur orange or orange and brown; foretibia and foretarsus orange; midtrochanter, midtrochantellus, and midfemur orange or orange and brown; midtibia entirely orange or with small black area basally; midtarsus orange; hind trochanter and hind trochantellus orange; hind femur usually orange; hind tibia entirely orange or slightly black basally; hind tarsus black and orange; wings clear or slightly infumate. *Body length:* excluding ovipositor 5.9–7.4. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 shorter than combined length of 3 + 4; mandible with or without indication of second tooth (as in Fig. 1b,c); glossa fork length 0.20–0.30; glossa length less than 2× galea length; glossa length 0.48–0.59; glossa length 0.44–0.53× shorter than foretibia length; malar space 0.31–0.46× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d) or wide and vestigial V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose, inverted V-shape anteriorly, setae present except along midline and posterior central area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 2–6; hind basitarsus either straight distally or very slightly tapered; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.71–0.92× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 2.2–2.3; ovipositor length 2.1–2.3× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Puebla, Matamoros, ix.8–9.1948 (Wagner) (AEIC). Paratypes: **Mexico:** Puebla: 7♀, 1♂, same data as holotype or ix.10.1948 (AEIC); 2♂, Petalcingo, viii.3.1963 (Parker & Stange) (USNM); 1♀, 1♂, 3 mi. N Petalcingo (Parker & Stange) (USNM), 3♂, 5 mi. S Izucar de Matamoros, viii.1.1963 (Parker & Stange) (USNM).

Remarks.—Similar to *A. kellyi, A. michelei* and *A. papoui*—see characters in the key.

Etymology.—In honor of the senior author's cousin.

Agathirsia cressoni (Muesebeck and Walkley)

Microdus thoracicus Cresson 1872: 181 (preoccupied by Nees von Esenbeck 1834: 143—currently *Earinus thoracicus*). [Examined].
Agathirsia thoracicus Szepligeti 1904: 129.
Agathirsia cressoni Muesebeck and Walkley 1951: 116.

Distribution (Fig. 11a).—Southeastern Texas to northeastern Mexico.

Females and males.—*Color:* Orange and black; black except as follows: antenna orange basally; maxillary and labial palpomeres mostly orange; pronotum orange dorsally; mesoscutum orange except sometimes black medially or entirely black; scutellum black and/or orange; metanotum black or black and orange; propodeum black or with some orange; foretrochanter and foretrochantellus black, or black and orange; forefemur black and orange; foretibia and foretarsus orange to pale yellow; midtrochantellus black or black and orange; midfemur mostly black to mostly orange; midtibia and midtarsus orange to pale yellow; hind trochanter and hind trochantellus black to orange; hind femur mostly black except slightly orange distally, sometimes mostly orange; hind tibia pale yellow, usually somewhat orange in distal quarter; hind tarsus orange to pale yellow; first tergum orange basally, black distally; remaining terga orange with 0 to

6 transverse black bands especially on terga 2 and 3, bands sometimes broken medially, dark mottling also occurs on some specimens; forewing shaded yellow to infumate in basal half, infumate in distal half; hind wing infumate or slightly infumate. *Body length:* excluding ovipositor 9.7–11.2. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible with or without indication of second tooth (as in Figs. 1b,c); glossa fork length 0.21–0.32; glossa length less than 2× galea length; glossa length 1.2–1.3; glossa length 0.60–0.69× shorter than foretibia length; malar space 0.38–0.45× shorter than eye height; face above clypeus with median longitudinal carinae; area anterior to ocellus with pits forming vestigial or distinct V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum rugose posteriorly, foveate anteriorly, inverted V-shape anteriorly, setae present except along midline and posterior central area (Fig. 6b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 14–21; hind basitarsus tapered distally; 1-cu-a and 1-M in forewing separated by approximately the width of 1-M, sometimes slightly more. *Metasoma:* Posterior width of first tergum 0.75–0.94× shorter than length of first tergum; setae on tergum 3 not dense (as in Fig. 6d), present on distal one third or less; tergum 3 with transverse groove; ovipositor length 1.8–2.2; ovipositor length 1.0–1.2× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, USA, Texas, type No. 1728.1 (ANSP). Homotypes: (44♀♂) ATAM, AEIC, ANSP, CNCI, TAMU, USNM.

Remarks.—Similar to *A. nigricauda*—see characters in the key and remarks under *A. nigricauda.*

Agathirsia davidi Pucci and Sharkey, sp. n.

Distribution (Fig. 11l).—Southern Arizona and Texas to northern Mexico.

Females and males.—*Color:* Mostly black except as follows: fore and midfemora with small orange area distally; fore and midtibiae black and pale yellow/orange; all tarsi pale yellow to black; hind tibia pale yellow basally laterally; forewing clear to slightly infumate in basal half, infumate in distal half; hind wing clear to slightly infumate. *Body length:* excluding ovipositor 6.8–9.6. *Head:* Longest seta at midlength of antenna approximately half antenna width (as in Fig. 7c); labial palpomere 2 subequal (as in Fig. 4b) or less to palpomeres 3 + 4; mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.20–0.30; glossa length less than 2× galea length; glossa length 0.54–0.71; glossa length 0.44–0.58× shorter than foretibia length; malar space 0.24–0.30× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose, setae present except along midline and posterior central area (Fig. 6a); sternaulus foveate (Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws small to distinct; number of thick, apically flattened apical pegs on hind tibia 5–9; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (Fig. 9c). *Metasoma:* Posterior width of first tergum 0.56–0.68× shorter than length of first tergum; setae on tergum 3 not dense (as in Fig. 6d) present for approximately distal 0.4; tergum 3 with transverse groove distinct or vestigial; ovipositor length 1.5–2.1; ovipositor

length 1.4–1.8× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, USA, Arizona, Parker Canyon Lk., viii.20.1974 (H. & M. Townes) (AEIC). Paratypes: **Mexico:** Chihuahua: 1♀, 1♂, 118 km N Chihuahua, viii.29.1991 (Griswold) (CNCI); 1♂, General Trias, viii.20.1991 (Griswold) (CNCI); Sonora: 1♀, Alamos, elev. 1200′, ix.22.1963 (Scullen & Bolinger) (OSUO); 1♀, 14 mi. W Alamos, elev. 800′, ix.22.1963 (Scullen & Bolinger) (OSUO); 1♀, 17 mi. E Navajoa, elev. 700′, ix.22.1963 (Scullen & Bolinger) (OSUO); 1♂, road 35 km SE Cancoba, viii.23.1971 (Rozen & Favreau) (AMNH); 1♂, road 35 km SE Cancoba, viii.29.1984 (Pulawski) (CASC); **USA:** Arizona: 2♀, 2♂, Cochise Co., Chiri. Mts. Pinery Cyn., 10 mi. NW Onion Saddle, viii.16.1965 (Ballmer) (USNM); 1♂, Cochise Co., Apache, viii.18.1964 (Rozen) (AMNH); 1♀, Cochise Co., Apache, viii.20.1971 (Rozen & Favreau) (AMNH); 1♂, Cochise Co., Willcox, viii.18.1958 (Hurd) (USNM); 1♀, Canelo, viii.22.1974 (H. & M. Townes) (AEIC); 2♀, Nogales, viii.24.1939 (Crandall) (USNM); 3♂, Nogales, viii.22.1974 (H. & M. Townes) (AEIC); 1♀, 3♂, Santa Cruz Co., 5 mi. N Lochiel, ix.6.1971 (Grissell & Denno) (UCDC); 1♀, 1♂, Santa Cruz Co., 17 mi. NE Patagonia, elev. 4950′, viii.27.1955 (Scullen) (USNM); 1♂, Santa Cruz Co., Pena Blanca, viii.30.1963. (Parker & Stange) (USNM); 3♀ same data as holotype (AEIC); 1♂, Sonoita, viii.21.1974 (H. & M. Townes) (AEIC); 1♀, 1♂, Pima Co., Sycamore, elev. 4000′, viii.15–16.1993 (Sharkey) (CNCI); Texas: 1♀, Jeff Davis Co., Madera Co., W Ft. Davis, viii.23.1969 (Board & Hafernik) (TAMU); 1♀, Jeff Davis Co., 20 mi. S Toyahvale on SR 17, viii.23.1974 (Greenbaum) (TAMU); 1♂, Jeff Davis Co., 11.3 mi. W SR 17 on SR 166, viii.21.1974 (Greenbaum) (TAMU); 4♂, Jeff Davis Co., Limpia Cyn., 2.3–4.1 mi. W Davis Mts., State Park on SR 118, viii.18–22.1974 (Greenbaum) (TAMU); 2♂, 1 mi. N Rockpile, W of Ft. Davis, viii.23.1969 (Board & Hafernik) (TAMU).

Remarks.—Similar to *A. capillata*, *A. keni* and *A. parkeningi*—see characters in the key and remarks under *A. capillata* and *A. parkeningi*.

Etymology.—In honor of the senior author's brother.

Agathirsia foveiseries Pucci and Sharkey, sp. n.

Distribution (Fig. 11h).—Known only from type locality in Arizona.

Holotype female.—Color: Mostly orange and black; orange except as follows: antenna black distally; maxillary and labial palpomeres black and orange; propleuron black; mesoscutum and scutellum orange; mesopleuron orange, black ventrally; metanotum orange; propodeum black and orange; metapleuron black and orange; forecoxa black; foretrochanter black and orange; foretarsus orange to testaceous; mid and hind trochanter black and orange; hind coxa with a little black; hind trochantellus black and orange; first tergum yellowish basally; remaining terga orange except dark mottling present; wings slightly infumate in basal half, infumate in distal half. *Body length:* excluding ovipositor 6.8. *Head:* Longest seta at midlength of antenna subequal to antenna width (as in Fig. 7c); labial palpomere 2× longer than combined length of 3 + 4 (similar to Fig. 4b); mandible with indication of second tooth (as in Fig. 1b); glossa fork length 0.41; glossa length less than 2× galea length; glossa length 0.78; glossa length 0.62× shorter than foretibia length; malar space 0.53× shorter than eye height; face above clypeus with median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion with line of foveae (as in Fig. 3d). *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum rugose, longitudinal oval shape medially, setae present except posterior central area and somewhat along midline;

sternalus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 6–8; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.46× shorter than length of first tergum; setae on tergum 3 present distal half; tergum 3 with transverse groove vestigial; ovipositor length 1.7; ovipositor length 1.4× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, USA, Arizona, Douglas, viii.27.1979 (Bohart) (UCDC).

Remarks.—The combination of facial sculpture and coloration is distinctive for this species. Due to the variation of propodeal sculpture found in *Agathirsia* and the fact that only one specimen has been examined, the oval-shaped areola of the propodeum, noted above, may not be a reliable character.

Etymology.—Line of foveae—referring to the lines of foveae on the face.

Agathirsia fulvocastanea Westwood

Agathirsia fulvo-castanea Westwood 1882: 22. [Examined].

Distribution.—Only known from the type locality which is an unknown site in Mexico.

Holotype female.—Color: Mostly orange to brownish orange; parts with other coloration are as follows: Antenna black distally; head with black areas medially on face and frons; pronotum slightly black ventrally; propleuron black; mesopleuron black ventrally; propodeum with small black area posteriorly; metapleuron black posteriorly; forecoxa black; midcoxa black; hind coxa with small black area ventrally; first tergum black basally; forewing slightly infumate in basal half, infumate in distal half; hind wing slightly infumate. *Body length:* excluding ovipositor 8.4. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 subequal to (as in Fig. 4b) or shorter than combined length of 3 + 4; mandible with indication of second tooth (as in Fig. 1b); glossa fork length 0.51; glossa length less than 2× galea length; glossa length 1.1; glossa length 0.79× shorter than foretibia length; malar space 0.53× shorter than eye height; face above clypeus with median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose to foveate, setae present except along midline (similar to Figs. 9a,b); sternaulus foveate (as in Fig. 5a) for posterior half to three quarters, absent anteriorly; mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 3–6; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.81× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove; ovipositor length 4.0; ovipositor length 2.7× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, 75 (Coffin) (OXUM).

Remarks.—Similar to *A. proxima, A. reai* and *A. rufula*—see characters in the key. In addition, *A. fulvocastanea* has foveate notauli and an indication of a second tooth unlike *A. proxima* and *A. rufula*. The presence of brownish-orange should not be used to decisively identify this species considering the similarity to what is called orange elsewhere.

Agathirsia heleni Pucci and Sharkey, sp. n.

Distribution (Fig. 11b).—Known only from type locality in San Luis Potosi, Mexico.

Holotype female and paratype male.—*Color:* Mostly orange except as follows: antenna black; head entirely black except clypeus sometimes dark orange; pronotum black ventrally; propleuron black; propodeum and metapleuron black; forecoxa black; foretrochanter and fore-trochantellus black or black and orange; midcoxa black or orange; midtrochanter black or black and orange; midtrochantellus, midfemur, midtibia, and midtarsus black; hind coxa black or black and orange; hind trochanter black or orange; hind trochantellus black or dark orange; hind femur black; hind tibia black distally, dark orange to black basally; hind tarsus black and orange; first tergum black; tergum 2 black basally, remaining terga dark orange or orange with black mottling; wings slightly infumate. *Body length:* excluding ovipositor 5.4–6.7. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 subequal to (as in Fig. 4b) or shorter than combined length of 3 + 4; mandible with very weak indication of second tooth; glossa fork length ~0.10 (?, difficult to measure on specimen); glossa length less than 2× galea length; glossa length 0.48? (glossa folded); glossa length 0.33–0.49× shorter than foretibia length; malar space 0.43× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus with pits partially forming V-shape (similar to Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose and setae present except smooth and glabrous along midline and posterior central area (setae as in Fig. 6a); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 3–5; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.74–0.77× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove; ovipositor length 1.4; ovipositor length 1.75× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, [San Luis Potosi], Metehuala, x.25.62 N.L. (Townes) (AEIC). Paratype: 1♂, same data as holotype (AEIC).

Remarks.—Similar to *A. armandi* and *A. bicolor*—see characters in the key and remarks under those species. The glossa in *A. armandi* and *A. bicolor* seems to be about twice the length of *A. heleni* but proper measurement of *A. heleni* has not been attained due to the condition of the specimens.

Etymology.—In honor of the senior author's mother.

Agathirsia jervisi Pucci and Sharkey, sp. n.

Distribution.—Known only from the type locality in Guerrero, Mexico.

Holotype female.—*Color:* Mostly black except as follows: antenna fuscous distally, pedicel orange distally; maxillary palp brown, lighter distally; labial palp fuscous basally and gradually turning yellow distally; ventral margin of clypeus brownish-orange; tibiae with small orange area basally and distally; fore- and mid tarsi mostly orange; hind tarsus partly orange; forewing clear in basal half, infumate in distal half; hind wing clear in basal half, slightly infumate in distal half. *Body length:* excluding ovipositor 5.8. *Head:* Longest seta at midlength of antenna approximately half antenna width (as in Fig. 7c); labial palpomere 2 subequal to combined length of 3 + 4; mandible with indication of second tooth (as in Fig. 1b); glossa fork length unknown; glossa length more than 2× galea length; glossa length 1.2; glossa length 1.0× longer than foretibia length; malar space .25× shorter than eye height; face above clypeus without longitudinal carinae; area anterior to ocellus with pits

forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum rugose, setae present except posterior central area; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 3; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum .85× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 1.0; ovipositor length .98× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, Mexico, Amula, Guerrero, 6000 ft. Aug. (H.H. Smith) Godman-Salvin Coll. (BMNH).

Remarks.—This is the only species with elongated labial palpi that are convex medially and form a drinking tube.

Etymology.—The specific name is in honor of Mark Jervis for his interesting research on hymenopteran mouthpart morphology.

Agathirsia kellyi Pucci and Sharkey, sp. n.

Distribution (Fig. 11i).—Known only from type locality in Puebla, Mexico.

Holotype male.—Color: Mostly Black except as follows: all femora and tibiae orange; all tarsi mostly orange; wings slightly infumate. *Body length:* excluding ovipositor 7.1. *Head:* Longest seta at midlength of antenna subequal to antenna width (as in Fig. 7c); labial palpomere 2 shorter than combined length of 3 + 4; mandible with indication of second tooth (as in Fig. 1b); glossa fork length 0.13; glossa length less than 2× galea length; glossa length 0.62; glossa length 0.52× shorter than foretibia length; malar space 0.36× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus without pits forming V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli complete, non foveate (as in Fig. 5b); propodeum foveate, inverted V-shape anteriorly, setae present except along midline and posterior central area (as in Fig. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 1–2; hind basitarsus straight distally; 1-cu-a and 1-M in forewing separated by a distance subequal to width of 1-M (see Fig. 9c). *Metasoma:* Posterior width of first tergum 0.68× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove vestigial; ovipositor length unknown.

Females.—Unknown.

Specimens examined.—Holotype: ♂, Mexico, Puebla, Huegotzingo, elev. 5–6000', viii.17.1962 (Milliron) (CNCI).

Remarks.—Similar to *A. collini*, *A. michelei* and *A. papoui*—see characters in the key.

Etymology.—In honor of the senior author's aunt.

Agathirsia keni Pucci and Sharkey, sp. n.

Distribution (Fig. 11g).—Known from 2 localities in Jalisco, Mexico.

Holotype female and paratype male.—Color: Mostly black except as follows: foretibia black or orange to brown; foretarsus sometimes with some orange distally; midtibia black or orange to brown; midtarsus orange to mostly black; hind tibia mostly pale yellow basally; forewing clear or slightly infumate in basal half, slightly infumate to infumate in distal half; hind wing clear to slightly infumate. *Body length:* excluding ovipositor 7.8–8.3. *Head:* Longest seta at midlength of antenna ap-

proximately half antenna width (as in Fig. 7c); labial palpomere 2 shorter than combined length of 3 + 4; presence of 2nd mandibular tooth not seen due to specimen position; glossa fork length 0.43; glossa length less than 2× galea length; glossa length 0.70–0.83; glossa length 0.51–0.61× shorter than foretibia length; malar space 0.33–0.37× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d) or vestigial V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum rugose, setae present except along midline (similar to Fig. 6a); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 5–8; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.79–0.92× shorter than length of first; setae on tergum 3 not dense (as in Fig. 6d), present on distal half; tergum 3 with transverse groove; ovipositor length 2.1; ovipositor length 1.6× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Jalisco, 18 mi. SW Guadalajara, ix.6.1971 (Villegas & Kane) (UCDC). Paratype: **Mexico**: Jalisco: 1♂, Lagos de Moreno, elev. 6300′, viii.12.1954 (Dreisbach) (USNM).

Remarks.—Similar to *A. capillata*, *A. davidi* and *A. parkeningi*—see characters in the key and remarks under *A. capillata*.

Etymology.—In honor of the senior author's uncle.

Agathirsia longigladia Pucci and Sharkey, sp. n.

Distribution (Fig. 11g).—Known only from type locality in Morelos, Mexico.

Holotype female and paratype male.—Color: Black except as follows: maxillary and labial palpomeres with some pale color femora and tibiae of fore and midlegs with small orange area distally; hind tibia with small orange area basally; forewing infumate or slightly infumate; hind wing clear to infumate in basal half, slightly infumate to infumate in distal half. *Body length:* excluding ovipositor 7.3–7.4. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 shorter than combined length of 3 + 4; mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.37–0.45; glossa length more than 2× galea length; glossa length 3.4–3.5; glossa length 2.6–2.7× longer than foretibia length; malar space 0.29–0.33× shorter than eye height; face above clypeus without or with vestigial longitudinal carinae; area anterior to ocellus without pits forming V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose posteriorly, foveate and longitudinal medial furrow anteriorly, setae present except along midline and posterior central area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 2–3; hind basitarsus straight distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.80× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove vestigial; ovipositor length 8.2; ovipositor length 8.2× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Morelos, Cuernavaca, 3i.19–21.1987 (Parker) (CNCI). Paratype: 1♂, same data as holotype (CNCI).

Remarks.—The combination glossa

length and coloration make this species distinctive.

Etymology.—Long sword—referring to the elongate ovipositor.

Agathirsia longilingua Pucci and Sharkey, sp. n.

Distribution (Fig. 11j).—Central Mexico.

Females and males.—Color: Mostly black except as follows: maxillary and labial palpomeres mostly orange; clypeus sometimes partially orange; fore and midfemora orange or orange and black; all tibiae and tarsi orange; hind femur black and orange, orange may be restricted to extreme distal portion; forewing slightly infumate or infumate in basal half, infumate in distal half; hind wing slightly infumate. *Body length:* excluding ovipositor 8.0–9.3. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 shorter than combined length of 3 + 4; mandible with or without indication of second tooth (as in Fig. 1b,c); glossa fork length 0.63–0.72; glossa length more than 2× galea length; glossa length 4.5–5.5; glossa length 2.8–3.1× longer than foretibia length; malar space 0.50–0.59× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum foveate except smooth or mostly smooth central area and rugosity surrounding and below spiracles, setae present except narrowly along midline (similar to Fig. 6a); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 10–12; hind basitarsus tapered distally; distance between 1-cu-a and 1-M in forewing subequal to the width of 1-M (see Fig. 9c). *Metasoma:* Posterior width of first tergum 0.80–0.93× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove distinct to absent; ovipositor length 5.3–6.9; ovipositor length 4.4–4.7× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Jalisco, San Fandia [San Fandila?], ix.24.1963 (Michelbacher) (EMEC). Paratypes: **Mexico:** Jalisco: 1♂, same data as holotype (EMEC); Queretaro: 3♀, 9 mi. N Queretaro, ix.21.1977 (Chemsak & A.&M. Michelbacher) (EMEC); Zacatecas: 1♀, 8 mi. NW Rio Grande ix.27.1975 (Villegas) (UCDC).

Remarks.—The combination of glossa length and coloration distinguishes this species from all others in the genus.

Etymology.—Long tongued—referring to the elongate glossa.

Agathirsia michelei Pucci and Sharkey, sp. n.

Distribution (Fig. 11l).—Known only from type locality in Jalisco, Mexico.

Holotype female.—Color: Mostly black and orange; black except as follows: maxillary and labial palpomeres mostly orange; all trochanters black and orange; all trochantelli femora and tibiae orange; terga with 3 dark reddish-brown transverse bands on terga 2 and 3; wings slightly infumate. *Body length:* excluding ovipositor 8.2; *Head:* Longest seta at midlength of antenna approximately half antenna width (as in Fig. 7c); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.49; glossa length less than 2× galea length; glossa length 1.4; glossa length equal to foretibia length; malar space 0.49× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus with pits forming vestigial V-shape (similar to Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum foveate, setae present except

along midline and central posterior area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 7–8; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.74× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove; ovipositor length 5.4; ovipositor length 4.9× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, Mexico, Jalisco, 12 mi. S Encarnacion de Diaz (C. & P. Vaurie) (AMNH).

Remarks.—Similar to *A. collini, A. kellyi* and *A. papoui*—see characters in the key.

Etymology.—In honor of the senior author's sister-in-law.

Agathirsia minuata Pucci and Sharkey, sp. n.

Distribution (Fig. 11k).—Known only from type locality.

Holotype female.—Color: Mostly orange except as follows: antenna black distally; mesosoma orange except propodeum somewhat darkened; midleg somewhat darkened, hind tibia darkened distally; hind tarsus black; large brown area on terga 2 and 3 (likely the result of stains caused by internal fluids); wings very slightly infumate. *Body length:* excluding ovipositor 5.7. *Head:* Longest seta at midlength of antenna approximately half antenna width (as in Fig. 7c); labial palpomere 2 shorter than combined length of 3 + 4; mandible with weak indication of second tooth; glossa fork length unknown; glossa length less than 2× galea length; glossa length approximately 0.20; glossa length 0.20× shorter than foretibia length; malar space 0.55× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum foveate, sparse setae present laterally; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 1–2; hind basitarsus straight distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.71× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 0.54; ovipositor length 0.73× shorter than hind basitarsus length.

Male.—Unknown.

Specimens examined.—Holotype: ♀, [USA, New Mexico] Hidalgo Co., Rodeo, viii.21.1958 (Bohart) (UCDC).

Remarks.—The combination of glossa length and coloration distinguishes this species from all others in the genus.

Etymology.—Small—referring to the relatively small glossa, ovipositor and overall length.

Agathirsia nigricauda (Viereck)

Crassomicrodus nigricaudus Viereck 1905: 288. [Examined].
Microdus nigricaudus Withington 1909: 329.
Agathirsia nigricauda Muesebeck 1927: 14.

Distribution (Fig. 11i).—Common in northern Mexico and southern Arizona, New Mexico, and Texas; occasionally found in states somewhat north of these.

Females and male.—Color: Quite variable, black and orange: black except as follows: Antenna orange basally; maxillary and labial palpomeres mostly orange; rarely orange behind ocelli and lateral area of face; clypeus sometimes orange; pronotum orange dorsally; mesoscutum orange, some-

times with black area anteriorly; scutellum black and/or orange; mesopleuron usually black, rarely mostly orange to orange; metanotum sometimes black and orange; propodeum black or black and orange, rarely entirely orange; metapleuron rarely with some orange; legs orange except: coxae of fore and midlegs black and/or orange, hind coxa orange or black and orange, fore and midtibiae orange to pale yellow, hind tibia pale yellow except usually at least somewhat orange in distal quarter, tarsi orange to testaceous; terga orange basally, black distally, rarely with black area basally and orange distally; forewing shaded yellow in basal half, slightly infumate to infumate in distal half; hind wing slightly infumate to infumate. *Body length:* excluding ovipositor 9.1–10.4. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 subequal to palpomeres 3 + 4 (Fig. 4b); mandible without indication of second tooth (as in Fig. 1c) or very weak; glossa fork length 0.19–0.34; glossa length less than 2× galea length; glossa length 1.2–1.5; glossa length 0.68–0.95× shorter than foretibia length; malar space 0.35–0.47× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d) or vestigial; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate, usually incomplete anteriorly (~75%) otherwise weakly or totally complete; propodeum foveate to rugose, less sculpture anteriorly, often with inverted V-shape anteriorly, central area usually depressed with sculpture differentiated from surrounding areas, setae present except along midline and central posterior area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 11–18; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.65–0.85× shorter than length of first tergum; setae on tergum 3 not dense (as in Fig. 6d), present on distal one third or less; tergum 3 with transverse groove distinct or vestigial; ovipositor length 2.2–3.2; ovipositor length 1.3–2.1× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Colorado, Colorado Springs, 5015 ft., 643, viii (Tucker) (SEMC). Homotypes: (200♀♂) AEIC, AMNH, CASC, CNCI, EMEC, LACM, MSUC, OSUO, SEMC, TAMU, UCDC, USNM.

Remarks.—Similar to *A. cressoni*—see characters in the key. The characters we used to separate these either have rare exceptions, e.g., terga coloration, hind femur color, notauli sculpture, and relative glossa length, or can be very similar, e.g., relative length of ovipositor. Although these species overlap in time and space, *A. nigricauda* has a greater geographic range and an earlier flight period. Specimens of both species have been collected within a few days from each other, late September to early October, in Pearsall, Texas. These specimens are housed in TAMU.

Agathirsia ninesevensi Pucci and Sharkey, sp. n.

Distribution (Fig. 11a).—Known only from type locality in Texas.

Holotype female.—Color: Mostly black except as follows: antenna fuscous basally; maxillary and labial palpomeres black and orange; foretrochantellus, forefemur, foretibia, and foretarsus orange; midtrochantellus, midfemur, midtibia, and midtarsus orange; hind leg orange except hind coxa black; terga orange except tergum 1 and distal tip of metasoma black; wings infumate. *Body length:* excluding ovipositor 8.2. *Head:* Longest seta at midlength of antenna > half antenna width (as in Fig. 7a); labial palpomere 2 shorter than combined length of 3 + 4; mandible without indi-

cation of second tooth (as in Fig. 1c); glossa fork length 0.23; glossa length less than 2× galea length; glossa length 0.94; glossa length 0.67× shorter than foretibia length; malar space 0.54× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus without pits forming V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate anteriorly, present as smooth groove medially and posteriorly; propodeum with large smooth and glabrous area medially, weak rugosity and sparse setae elsewhere; sternaulus foveate (as in Fig. 5a) posteriorly, smooth groove anteriorly; mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 3–4; hind basitarsus tapered distally; 1-cu-a and 1-M in forewing partially or nearly overlapping. *Metasoma:* Posterior width of first tergum 0.61× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 3.4; ovipositor length 2.8× longer than hind basitarsus length.

Male.—Unknown.

Specimens examined.—Holotype: ♀, USA, Texas, Pecos Co., x.17.1973 (Bohart) (UCDC).

Remarks.—Similar to *A. campanisura*—see characters in the key and remarks under *A. campanisura.*

Etymology.—In honor of the musical group Old 97's.

Agathirsia papoui Pucci and Sharkey, sp. n.

Distribution (Fig. 11b).—Central Mexico.

Females and males.—*Color:* Most black except as follows: maxillary and labial palpomeres sometimes with pale color; femora orange; tibiae orange except hind tibia may be darkened distally; tarsi orange or mostly orange except hind tarsus may be dark orange; wings clear to slightly infumate. *Body length:* excluding ovipositor 7.8–8.6. *Head:* Longest seta at midlength of antenna subequal to half or less antenna width (as in Figs. 11b,c); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible with or without indication of second tooth (as in Figs. 1b,c); glossa fork length 0.11–0.24; glossa length less than 2× galea length; glossa length 0.49–0.60; glossa length 0.36–0.46× shorter than foretibia length; malar space 0.28–0.33× shorter than eye height; face above clypeus with median longitudinal carinae; area anterior to ocellus with or without pits forming V-shape; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose, central area depressed, setae present except narrowly along midline (similar to Fig. 6a); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 9–15; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.67–0.73× shorter than length of first tergum; setae on tergum 3 not dense (as in Fig. 6d), present on distal third to half; tergum 3 with transverse groove; ovipositor length 0.83–0.88; ovipositor length 0.69–0.73× shorter than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Hidalgo, 13.5 mi. NE Tizayuca, elev. 7700', viii.28.1962 (SEMC). Paratypes: **Mexico:** Guanajuato: 1♂, 10 mi. NW Leon, viii.19.1954 (Chillcott) (CNCI); Hidalgo: 1♀, 3♂, same data as holotype (SEMC); 1♂, same data as holotype except 3.5 mi. NE Tizayuca (SEMC); Jalisco: 1♂ [metasoma missing], 1♂, Guadalajara, [♂ date], (McClendon) (ANSP).

Remarks.—Similar to *A. collini, A. kellyi* and *A. michelei*—see characters in the key. We have viewed a damaged specimen re-

sembling *A. papoui* except that the length of the glossa appears to be subequal to the foretibia. It was collected in Mexico, Jalisco, Largos de Moreno, elev. 6400', August 21, 1954 and is housed in SEMC.

Etymology.—In honor of the senior author's grandfather.

Agathirsia parkeningi Pucci and Sharkey, sp. n.

Distribution (Fig. 11e).—Known only from type locality in Jalisco, Mexico.

Holotype female.—Color: Mostly black except as follows: maxillary and labial palpomeres with some pale color; all femora with small orange area distally; all tibiae with some orange basally; foretarsus with some pale color; midtarsus mostly black; hind tarsus pale yellow basally, black distally; wings infumate. *Body length:* excluding ovipositor 7.1. *Head:* Longest seta at midlength of antenna approximately half or < half antenna width (as in Fig. 11b-c); labial palpomere 2 shorter than combined length of 3 + 4; mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.49; glossa length less than 2× galea length; glossa length 1.2; glossa length 0.86× shorter than foretibia length; malar space 0.43× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum foveate, setae present throughout; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 3–4; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.60× shorter than length of first tergum; setae on tergum 3 not dense (as in Fig. 6d), present on distal one third; tergum 3 with wide shallow area; ovipositor length 5.6; ovipositor length 5.1× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, Mexico, Jalisco, Zapotlanejo, x.3.[19]66 (G.E. & A.S. Bohart) (CNCI).

Remarks.—Similar to *A. capillata, A. davidi* and *A. keni*—see characters in the key. In addition, glossa length and malar space are distinctly longer in *A. parkeningi* than in the others.

Etymology.—In honor of the musician Christopher Parkening.

Agathirsia proxima Westwood

Agathirsia proxima Westwood 1882: 22. [Examined].

Agathirsia rufiventris Westwood 1882: 21. [Examined]. **Syn. n.**

Distribution (Fig. 11h).—Central to southern Mexico.

Females and males.—Color: Orange and black, color quite variable; antenna orange basally black distally; maxillary and labial palpomeres mostly orange; head orange except at least central area of face black, often frons and face black, rarely entirely black; pronotum varies from orange, to black with small orange area dorsally; propleuron black or orange and black; mesoscutum orange; scutellum orange or black and orange; mesopleuron mostly orange to black; metanotum black or black and orange; propodeum black to orange; metapleuron black to mostly orange with some black; (rarely mesosoma entirely black); legs orange except sometimes black on basal portion of coxae, tarsi orange to pale yellow; terga orange except often with black or dark orange mottling; forewing slightly infumate in basal half, infumate or slightly infumate in distal half; hind wing slightly infumate. *Body length:* excluding ovipositor 7.3–9.0. *Head:* Longest seta at midlength of antenna approximately half or < half antenna width (as in Figs. 11b,c); labial palpomere 2

shorter than combined length of 3 + 4; mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.56–0.69; glossa length more than 2× galea length; glossa length 3.1–3.9; glossa length 2.2–2.8× longer than foretibia length; malar space 0.38–0.49× shorter than eye height; face above clypeus without or with vestigial longitudinal carinae; area anterior to ocellus with pits forming vestigial V-shape (similar to Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli complete, non foveate (Fig. 5b); propodeum weakly sculptured, usually with small depression along anterior midline, smooth below, setae present except along midline and central posterior area (as in Figs. 9a,b); sternaulus with few foveae at extreme base (Fig. 5c); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 3–6; hind basitarsus straight distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.59–0.82× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove distinct to absent; ovipositor length 6.0–7.1; ovipositor length 5.0–5.6× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, 74 (Coffin) (OXUM). Coffin #25 "Also at Los Barros. Hovering in the neighbourhood of plants inhabited by larvae." Homotypes: (33♀♂) AMNH, CNCI, EMEC, OXUM, UCDC.

Remarks.—Very similar to *A. rufula*—the characters in the key are the only ones found to distinguish these species. Also similar to *A. fulvocastanea* and *A. reai*—see characters in the key and remarks under *A. fulvocastanea*. We have viewed three specimens that we consider to be melanic forms, one of these being the holotype of *A. rufiventris*. The head and mesosoma are completely black.

Agathirsia reai Pucci and Sharkey, sp. n.

Distribution (Fig. 11k).—South-central Mexico.

Females.—Color: Mostly orange except as follows: antenna black or with some orange basally; maxillary and labial palpomeres mostly orange; head black except orange clypeus and behind ocellus; propodeum and metapleuron with some black; wings clear in basal half, infumate in distal half or slightly infumate throughout. *Body length:* excluding ovipositor 6.5–7.4. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible with indication of second tooth (as in Fig. 1b); glossa fork length 0.31; glossa length less than 2× galea length; glossa length 0.89–1.0; glossa length 0.71–0.86× shorter than foretibia length; malar space 0.45–0.53× shorter than eye height; face above clypeus with distinct or vestigial longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum foveate, with or without inverted V-shape anteriorly, setae present except along midline and central posterior area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 1–2; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.73–0.82× shorter than length of first tergum; setae on tergum 3 absent; tergum 3 with shallow indentation; ovipositor length 5.4–6.3; ovipositor length 5.4–5.7× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype: ♀, Mexico, Morelos, Lk. Tequesquitengo, approx. 5000′, ix.13.1957 (Scullen) (CNCI). Paratype: **Mexico:** Puebla: 1♀, Chietla, Atencingo, elev. 1098 m, ix.25.1989 (Pena) (ATAM).

Remarks.—Similar to *A. fulvocastanea*, *A. proxima* and *A. rufula*—see characters in the key and remarks under *A. fulvocastanea*.

Etymology.—In honor of the senior author's grandmother.

Agathirsia rostrata Pucci and Sharkey, sp. n.

Distribution (Fig. 11g).—Northeastern to south-central Mexico.

Females and males.—*Color:* Mostly black except as follows: antenna sometimes dark orange basally; fore and midfemora sometimes with small orange area distally; foretibia completely fuscous or orange basally; foretarsus orange or fuscous basally; midtibia orange or fuscous basally; midtarsus orange basally; hind tibia orange basally; hind tarsus black and orange; wings infumate. *Body length:* excluding ovipositor 5.8–6.8. *Head:* Longest seta at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 shorter than combined length of 3 + 4; mandible with indication of second tooth (as in Fig. 1b) or vestigial; glossa fork length 0.10–0.14; glossa length less than 2× galea length; glossa length 0.48–0.53; glossa length 0.45× shorter than foretibia length; malar space 0.50–0.59× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus with or without pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion with line of foveae, rarely vestigial (Fig. 3d). *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum mildly rugose, sometimes with medial furrow anteriorly, long, dense setae throughout; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a) or vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 1–5; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.63–0.65× shorter than length of first tergum; setae on tergum 3 not dense (as in Fig. 6d), present on distal half; tergum 3 without transverse groove; ovipositor length 2.8–3.1; ovipositor length 2.5–2.8× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, Puebla, 30 mi. SW Tehuacan, elev. 6800′, x.13.1968 (R.H. & E.M. Painter) (AEIC). Paratypes: **Mexico:** Nuevo Leon: 1♀, San Pedro Iturbide, 32 km W Linares, x.6.1962 (H. & M. Townes) (AEIC); Puebla: 1♀, same data as holotype (AEIC); 1♂, nr. Puebla, x.15.1962 (Townes) (AEIC).

Remarks.—The combination of facial sculpture and coloration is diagnostic for this species. In addition, the head in frontal view appears somewhat like a rostrum (Fig. 3d), similar to that of *Agathis* species.

Etymology.—Beaked, with a muzzle—referring to the head shape.

Agathirsia rufula Westwood

Agathirsia rufula Westwood 1882: 21. [Examined].

Distribution (Fig. 11d).—South-central Mexico.

Females and males.—*Color:* Mostly orange except as follows: antenna black distally; maxillary and labial palpomeres with some orange; frons and face black medially; pronotum black ventrally; propleuron black or black and orange; mesopleuron mostly black to mostly orange; metanotum orange or black and orange; propodeum black and orange; metapleuron black or black and orange; tarsi sometimes pale yellow; terga usually orange to dark orange except black mottling often present; wings infumate to slightly infumate.

Body length: excluding ovipositor 6.8–8.2. *Head:* Longest seta at midlength of antenna approximately half or < half antenna width (as in Fig. 11b-c); labial palpomere 2 shorter than palpomeres 3 + 4; mandible without indication of second tooth (as in Fig. 1c); glossa fork length 0.45–0.51; glossa length more than 2× galea length; glossa length 2.1–2.6; glossa length 1.6–2.0× longer than foretibia length; malar space 0.48–0.51× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming wide V-shape or vestigial wide V-shape (similar to Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli not foveate (as in Fig. 5b), complete or not complete; propodeum weakly sculptured, depression along anterior midline, setae present except along midline and central posterior area (as in Figs. 9a,b); sternaulus foveate (as in Fig. 5a) posteriorly, absent anteriorly; mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 2–6; hind basitarsus straight distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.69–0.84× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 with transverse groove; ovipositor length 4.4–5.8; ovipositor length 4.0–6.1× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, 72 (Coffin) (OXUM). Coffin # 405 Sept. 1840, nr. Chapultepec. Homotypes: (8♀♂) AEIC, ATAM, CNCI, OSUO, OXUM.

Remarks.—Very similar to *A. proxima*—the characters in the key are the only ones found to distinguish the two species. Also similar to *A. fulvocastanea* and *A. reai*—see characters in the key and remarks under *A. fulvocastanea*.

Agathirsia sericans (Westwood)

Agathona sericans Westwood 1882: 23. [Lectotype. Examined].
Agathirsia sericans Szepligeti 1904: 129.

Distribution (Fig. 11c).—Southwestern to south-central Mexico.

Females and males.—*Color:* Mostly black except as follows: antenna sometimes orange basally; maxillary and labial palpomeres with some pale color; mesoscutum sometimes partly orange; fore and mid legs from entirely orange to black; hind femur sometimes with small orange area distally; hind tibia with some orange; hind tarsus with varying degrees of orange; first tergum with yellow or orange area basally; tergum 2 yellow basally; forewing infumate but usually darker in distal half; hind wing slightly infumate. *Body length:* excluding ovipositor 10.0–11.6. *Head:* Longest seta at midlength of antenna approximately half antenna width or shorter (as in Fig. 11b,c); labial palpomere 2 subequal to combined length of 3 + 4 (as in Fig. 4b); mandible with or without indication of second tooth (as in Figs. 1b,c); glossa fork length 0.38–0.47; glossa length less than 2× galea length; glossa length 1.5–1.8; glossa length 0.85–1.2× as long as foretibia length; malar space 0.31–0.39× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus with pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum foveate to rugose, often with inverted V-shape anteriorly and carina extending from medial posterior end to center of propodeum, setae present throughout or glabrous along midline and/or posteriorly; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws small to vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 8–13; hind basitarsus tapered distally; 1-cu-

a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.43–0.53× shorter than length of first tergum; setae on tergum 3 dense on distal 0.75 to throughout and colored yellow except rarely white; tergum 3 with transverse groove distinct to absent; ovipositor length 1.0–1.6; ovipositor length .63-.87× shorter than hind basitarsus length.

Specimens examined.—Lectotype: ♀, Mexico, 76 ½ (Coffin) (OXUM): designated by van Achterberg, 1980. Homotypes: (19♀♂) AEIC, ATAM, EMEC, CASC, CNCI, LACM, MSUC, OSUO, OXUM, SEMC.

Remarks.—Similar to *A. trichiosoma* and *A. asterophila*—see characters in the key.

Agathirsia testacea Muesebeck

Agathirsia testacea Muesebeck 1927: 13. [Examined].

Distribution (Fig. 11j).—Central California to southeast Texas south to central Mexico.

Females and males.—Color: Mostly orange except as follows: antenna black distally; maxillary and labial palpomeres partly black; mesosoma may contain black areas; hind tibia usually black distally and hind tarsus usually somewhat darkened; black mottling usually present on terga; fore and hind wings from completely infumate to clear in basal half and infumate in distal half. *Body length:* excluding ovipositor 6.7–8.4 (one exceptional specimen 5.5). *Head:* Longest setae at midlength of antenna < half antenna width (as in Fig. 7b); labial palpomere 2 shorter than combined length of palpomeres 3 + 4; mandible with indication of second tooth (Fig. 1b), rarely distinct or weak indication; glossa fork length 0.12–0.20; glossa length less than 2× galea length; glossa length 0.43–0.53; glossa length 0.35–0.42× shorter than foretibia length; malar space 0.48–0.65× shorter than eye height; face without median longitudinal carinae; area anterior to ocellus with pits forming distinct V-shape (Fig. 7d) or vestigial; area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli complete, varying from smoothly impressed to foveate; propodeum rugose, setae present laterally; sternaulus foveate (as in Fig. 5a); mesepisternum with pair of lobes between midcoxae (Fig. 5d); basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 6–14; hind basitarsus tapered distally; 1cu-a and 1-M of forewing almost contiguous, separated by the width of a vein or less (Fig. 9c). *Metasoma:* Posterior width of first tergum 0.85–1.13× as long as length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 3.2–3.6; ovipositor length 2.4–3.0× longer than hind basitarsus length.

Specimens examined.—Holotype: ♀, USA, Mesilla [New Mexico], xi.6 (USNM). Homotypes: (285♀♂) AEIC, AMNH, CASC, CNCI, EMEC, LACM, MSUC, OSUO, SEMC, TAMU, UADE, UCDC, USNM.

Remarks.—The lobes between the midcoxae are distinctive for this species (Fig. 5d).

A. testacea is the most commonly collected species of *Agathirsia* and has one of the largest geographic ranges. The range of collection dates extends well into spring, which is unusual for *Agathirsia.*

Bibby (1961) cites the larva of *Acontia cretata* (Noctuidae) as a host of *A. testacea* from Yuma Arizona, viii.19.1953.

Agathirsia tiro Pucci and Sharkey, sp. n.

Distribution (Fig. 11k).—Southern Texas and northeast Mexico.

Females.—Color: Black and orange, orange except as follows: antenna black; maxillary and labial palpomeres partly black; head black; mesosoma black; fore and midcoxa partly black; hind tibia black to dark orange basally; hind tarsus black

to orange; first tergum black or orange; remaining terga with some black mottling; forewing slightly infumate to infumate in basal half, clear to slightly infumate in distal half but lighter than basal portion; hind wing slightly infumate in basal half, clear to slightly infumate in distal half. *Body length:* excluding ovipositor 5.7–5.9. *Head:* Longest seta at midlength of antenna > half antenna width (as in Fig. 7a); labial palpomere 2 shorter than combined length of 3 + 4; mandible with indication of second tooth (as in Fig. 1b); glossa fork length unknown; glossa length less than 2× galea length; glossa length approximately 0.25; glossa length approximately 0.22–0.32× shorter than foretibia length; malar space 0.46–0.52× shorter than eye height; face above clypeus without median longitudinal carinae; area anterior to ocellus with or without pits forming V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion without line of foveae. *Mesosoma:* Notauli weakly foveate basally, barely impressed as smooth groove elsewhere; propodeum largely smooth medially, foveate elsewhere, setae present except along midline; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws vestigial (as in Fig. 3b); number of thick, apically flattened apical pegs on hind tibia 2–4; hind basitarsus straight distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.73–0.87× shorter than length of first tergum; setae on tergum 3 sparse distally (as in Fig. 6d); tergum 3 without transverse groove; ovipositor length 1.2–1.3; ovipositor length 1.5–1.6× longer than hind basitarsus length.

Males.—Unknown.

Specimens examined.—Holotype. ♀, Mexico, Nuevo Leon, 50 mi. S Nuevo Laredo, ii.22.1972 (Parker & Miller) (AEIC). Paratypes: 2♀, same data as holotype (AEIC); USA: Texas: 1♀, Del Rio, iv.18.1984 (Bohart) (UCDC); 1♀, Southmost [Ranch, School or Cemetery?], Carneton Co. [Cameron Co.?], iv.13.1956 (Beamers, Stephen, Michener & Rozen) (SEMC).

Remarks.—The combination of glossa length and coloration makes this species distinctive.

Etymology.—Recruit, beginner—referring to the relatively early (spring) collection dates.

Agathirsia trichiosoma (Cameron), n. comb.

Cenostomus trichiosomus Cameron 1905: 387. [Examined].

Agathis trichiosoma Shenefelt 1970: 362.

Distribution (Fig. 11f).—Southwestern to south-central Mexico.

Females and males.—*Color:* Mostly black except as follows: maxillary and labial palpomeres partly pale; head black; mesosoma black; foretibia partly pale; foretarsus pale yellow to orange to fuscous; midtibia partly pale yellow; midtarsus sometimes orange to pale yellow; hind tibia pale yellow/orange basally extending distally on lateral side; hind tarsus sometimes with orange or pale yellow; first tergum sometimes with small yellow/orange area basally; tergum 2 with some yellow or orange basally; forewing slightly infumate in basal half, infumate in distal half; hind wing slightly infumate. *Body length:* excluding ovipositor 8.5–12.0. *Head:* Longest seta at midlength of antenna subequal to 0.5–0.75 antenna width (as in Figs. 11a,c); labial palpomere 2 subequal to palpomeres 3 + 4 (as in Fig. 4b); mandible without indication of second tooth (as in Fig. 1c) or weak; glossa fork length 0.17–0.23; glossa length less than 2× galea length; glossa length 0.60–0.76; glossa length 0.40–0.51× shorter than foretibia length; malar space 0.22–0.27× shorter than eye height; face above clypeus with or without median longitudinal carinae; area anterior to ocellus without pits forming distinct or vestigial V-shape (as in Fig. 7d); area between tentorial pit and antennal insertion

without line of foveae. *Mesosoma:* Notauli foveate and complete (as in Fig. 5a); propodeum rugose, longitudinal furrow anteriorly, long, dense setae throughout; sternaulus foveate (as in Fig. 5a); mesepisternum without lobes between midcoxae; basal lobe of claws distinct (as in Fig. 3a); number of thick, apically flattened apical pegs on hind tibia 6–10; hind basitarsus tapered distally; 1-cu-a and 1-M of forewing separated by a distance greater than 2 vein widths (as in Fig. 9c). *Metasoma:* Posterior width of first tergum 0.43–0.59× shorter than length of first tergum; setae on tergum 3 dense on distal 0.66–0.75; tergum 3 with transverse groove; ovipositor length 0.87–0.97; ovipositor length 0.54–0.78× shorter than hind basitarsus length.

Specimens examined.—Holotype: ♀, Mexico, B.M. HYM. 3.c.974 (BMNH). Homotypes: (23♀♂) AEIC, ATAM, BMNH, CASC, CNCI, MSUC, SEMC, UADE, UCDC, USNM.

Remarks.—Similar to *A. sericans*—see characters in the key.

We recognize two forms that may be separate species. None of the following characters used to distinguish them are without exceptions and the putative forms overlap in time and space. Type I (holotype form): tergum 2 completely yellow or orange behind gently sloping groove, black hind basitarsus, median body length 10.8. Type II: tergum 2 partially yellow or orange behind V-shaped groove, pale yellow hind basitarsus, median body length 9.2.

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